

In this Issue—*The Ideal Service Floor*

# MOTOR AGE

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Number 4

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CHICAGO, JANUARY 22, 1920

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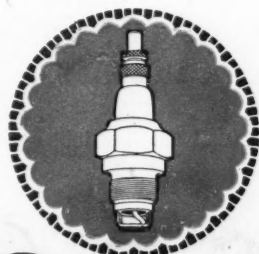
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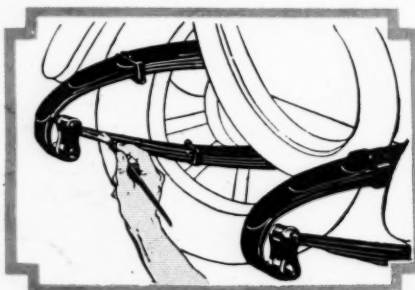
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# MOTOR AGE

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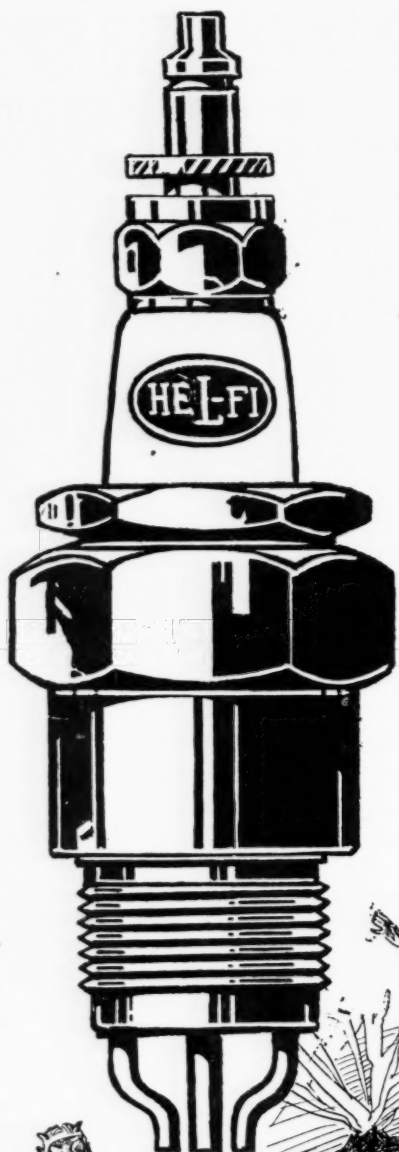
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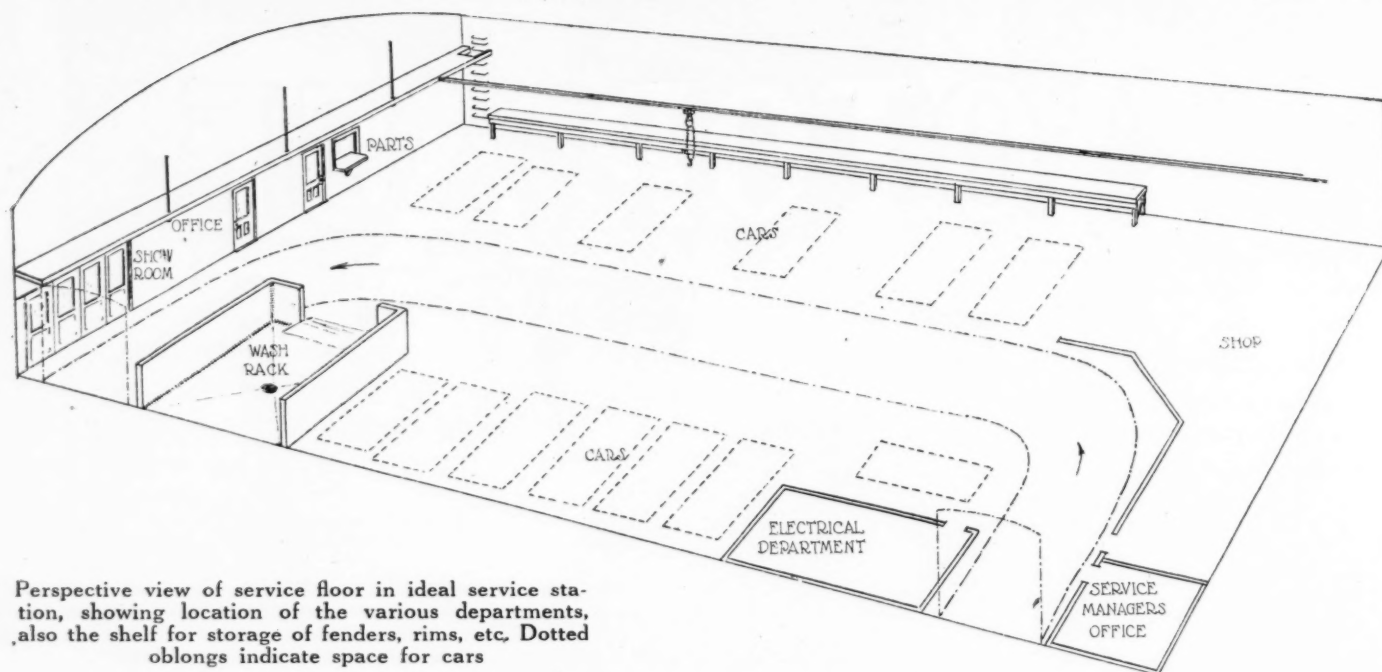
"THERE IS A  
**HEL-FI**

FOR EVERY MOTOR"

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Perspective view of service floor in ideal service station, showing location of the various departments, also the shelf for storage of fenders, rims, etc. Dotted oblongs indicate space for cars

we mean that part of the building where car owners drive in, suffers by comparison with our modern stores and shops for some very good reasons. In the first place when you go into a modern department store you are hailed by the floor walker and in a courteous manner directed to the particular department you want. At that point a competent clerk takes care of you, you are told the cost of your purchase, make payment, told to come in again and go out. All the time you have been imbued with the spirit of the place. The windows are clean and well trimmed, the floor, show-cases, wares and clerks are spotless, things are well arranged, in short, the whole atmosphere of the place is inviting and you feel like going there again.

#### First Impressions Lasting

Contrast the above with the average run of service stations. We drive in and somebody may receive us, or as is too often the case, do not receive us. We might as well be on the desert of Sahara as far as our usefulness is concerned where we are. Finally we spot a grease-beamed mechanic on some errand around the shop and hail him, only to find out that he has nothing to do with shooting troubles, but that so and so will be through in a minute and then will look after us. We wait and size up the place. The windows are dirty and covered with cobwebs. Puddles of water and oil make the floor look like a cobble-stone paved street after a rain. Mechanics or helpers lay dirty tools and parts right on the polished surface of fenders, sit on the clean cushions in the front seat while adjusting the spark and throttle levers, grip the steering wheel with a grimy hand and do all sorts of other things that go against our grain. There is no systematic way of doing things. Men take many unnecessary steps. In short, the place has not been put on the same basis as the department

store and as we said before, there is no difference between selling service or anything else. It is just as easy to make a service station inviting as in the case of a department store, even if in the former much of the work means getting into messy gearsets or crankcases. There is no excuse for a dirty service floor, or the customer's cars getting messed up because of lack of proper protection. True, the floor will get sprinkled with oil or grease at times, but that is no reason why it need remain that way.

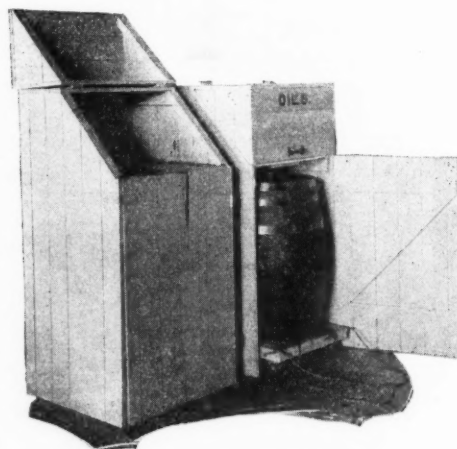
#### Dirty Jobs Out of Sight

With the proper personnel and arrangement of the departments on the service floor so that certain dirty jobs are performed out of sight and customers will feel just as much at home as in the department store, the service manager can route through incoming cars without delay and run his end of the business in the same systematic manner on which any well conducted business is run. And this brings us to the subject of this article, the layout of the service floor.

**THE FLOOR**—Regarding the actual floor construction much depends on the nature of the building. In some instances there will be a wood floor, but so far as possible concrete should be used, as this can be finished off quite smooth and is easily cleaned of dirt and grease. It also affords a good rolling surface for cranes, portable benches, etc. Concrete is, of course, necessary in the case of the wash rack floor and it might well be carried up on the sides. If expense is not the greatest consideration the wash rack sides can be built up with white tile or some similar material, which will lend an atmosphere of cleanliness to the place. If a new floor is to be put in, this might be of vitrified brick, leaving at least  $\frac{1}{2}$  in. seams which afterwards are filled with hot asphaltum. This should

be allowed to set, after which the seams again are filled flush with the asphaltum.

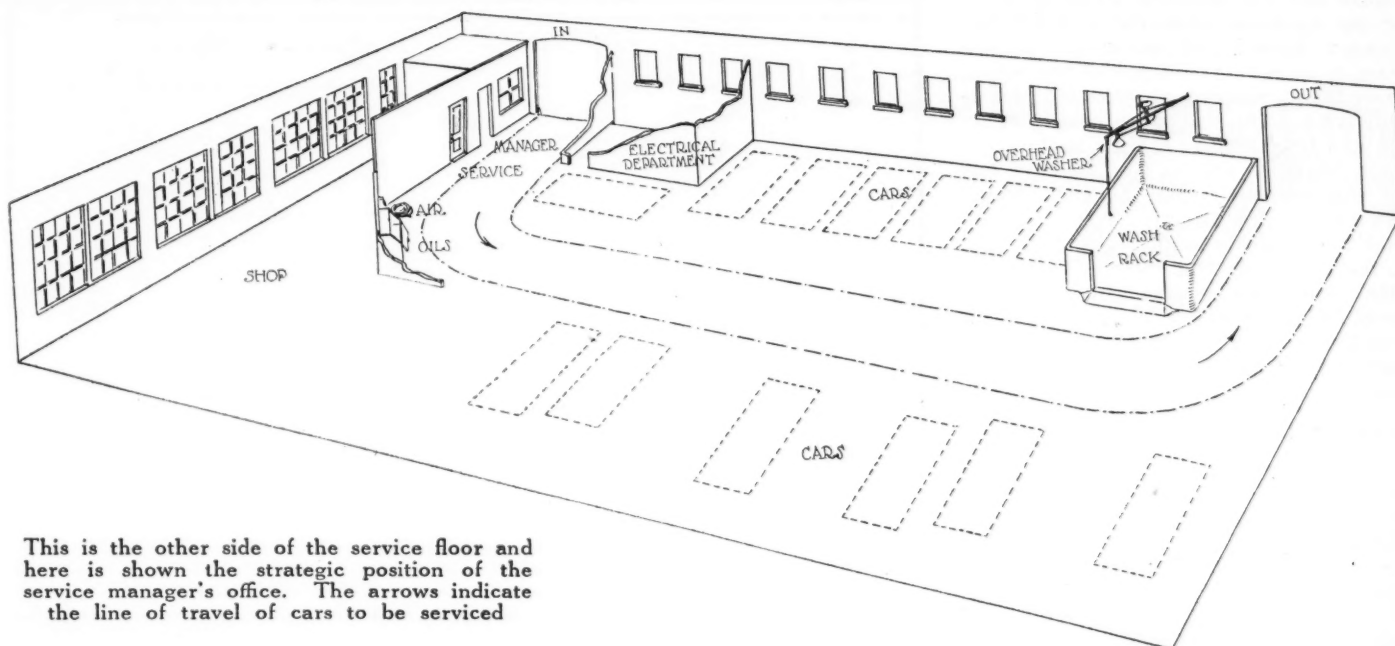
The service floor shown herewith calls for concrete and in the construction of the building there should be a liberal sized fillet between floor and walls everywhere, which prevents foreign matter from lodging there. A fillet also should be used in the construction of the wash rack, patterned after the ac-



Here is a good way to keep oils and greases. It adds to the appearance of the building, besides being handy

companying illustration, to keep water from getting on the floor proper.

Pay particular attention to the appearance of the entrance to the service station, because it is here that the customer gets his first impression of the place. An inviting entrance gives the whole place a boost and customers naturally conclude that the shop or any other department is run on the basis of cleanliness with better workmanship resulting as a matter of course. It would be no mistake to build the floor of the entrance way of tile, extending into the



This is the other side of the service floor and here is shown the strategic position of the service manager's office. The arrows indicate the line of travel of cars to be serviced

building for a short distance and give to the service floor the same distinction afforded from the use of tile on the floor of the salesroom in front of the building.



A cabinet of drawers used by one service station for keeping small parts like lamp bulbs, fuses, etc. This eliminates many unnecessary steps

Always bear in mind that service should be sold on the same basis as any other legitimate commodity and if you allow your service floor or any other part of the service department to get muddled up, you are on the level of the store with dirty floors, poor display of merchandise and slipshod methods.

**SERVICE MANAGER'S OFFICE**—Note that in the layout this has been put at the most strategic position. Never put the service manager's office in the front of the building. It doesn't belong there. It is too far from the scenes of activi-

ties. What applies to the floor applies to the service manager's office also, that is, make it attractive and fit it up so work can be handled without confusion. The office should have a door off the service entrance and it is perhaps a good idea to also have a door on the outside, so that should a customer leave his car at the curb he could enter the office without the large door being opened.

#### Push Button System

Regarding the fitments of the office, we should expect to see it fitted up in much the same manner as the main office or sales office in front of the building, only on a smaller scale. It is in the service manager's office that the customers must sign what constitutes a service contract, so there must be a desk, chairs, filing cabinet, and other equipment found in a well conducted office. There should be a rack of some sort on which are hung large drawings or reproductions of service operations so that the manager easily can explain to customers the nature of the work to be undertaken and thus justify a bill that may seem excessive to the lay mind. The service manager should have a series of push buttons in his office and a duplicate set on the exterior of the office, so that when talking to a customer who may want his battery checked up for instance, it becomes only necessary to press the button sounding the buzzer in the battery department and the right man will come out without a word having been spoken or a lot of shouting back and forth in various departments.

This push button system can be made a powerful factor in the rendering of quick and efficient service. For instance, one push of the button in the battery department might mean there is a customer who wants his battery tested and filled with distilled water. Thus the battery man comes out with a water dispenser and hydrometer and no time

is lost on the job and the customer wonders how on earth the battery man knew just what to bring out with him. In the same way a push or two on another button will call out the expert on starting and lighting troubles, or the shop foreman for consultation.

**AIR HOSE, OILS and TIRE MACHINE**—Much of the work in a service station consists of putting fresh oil in the crankcase, changing tires on rims or filling tires with air and the work is of such a nature that the equipment and supplies necessary can be grouped in one part of the building. In this case the air hose, oil retainers and tire machine have been placed close to the manager's office, being just on the other side of the partition between the drive-in and machine shop. The air hose should, if possible, be wound on a reel so that when not in use it will be out of the way and yet accessible for instant use.

#### Container for Oils and Greases

The oils and greases can be kept in a wooden container as shown in one of the accompanying illustrations, a method used by one large service station. The tire machine is handy for changing tires on rims and does away with all pounding, etc., besides looking much more businesslike.

**OTHER EQUIPMENT**—As shown the workbench extends the entire length of the wall, it being on this side of the building where the actual repair work goes on, unless the job must be handled in the machine shop, as an engine overhaul, axle overhaul, etc. But jobs like valve grinding, carbon removal, front wheel bearing adjustment, and other similar jobs are to be done on the bench side of the building, so it is well to have a long bench, fitted at certain intervals with a vise. In fact there should be as many vises as there are spaces for cars, or at least one vise for every two cars.

The bench should be made of 2 in.

planks and the supports either of wood or the cast-iron supports sold by machinery houses can be used. If you want to do a real good job of the bench, cover the planks with sheet metal, preferably zinc. This makes a good looking job and it is easy to clean. Besides the main bench it will be well to have one or two portable repair benches, which can be wheeled directly to the car and thus save much running back and forth to the main bench for tools or use of the vise. There are several makes of these portable repair benches on the market which are better than the home made variety, but the latter are better than nothing.

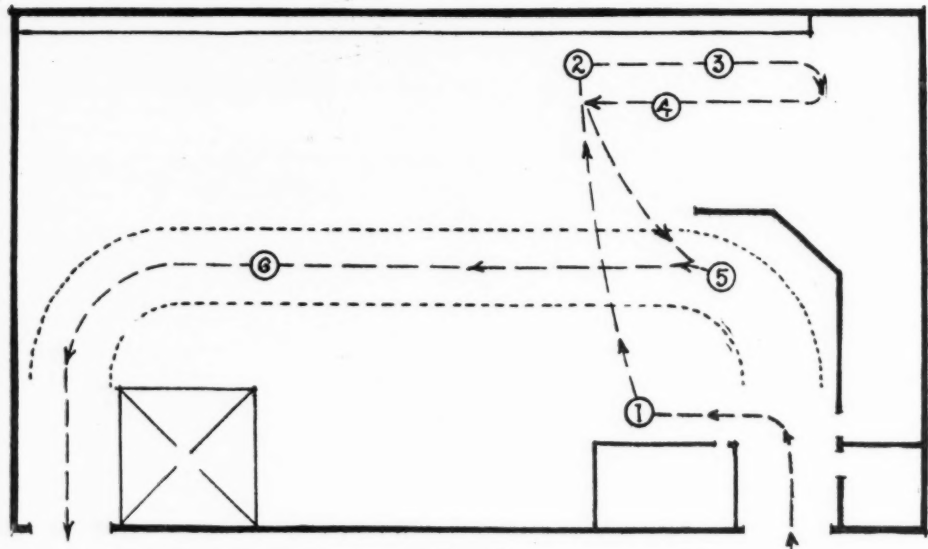
#### Overhead Track and Carrier

The overhead track and carrier supporting the chain hoist has been described in a previous issue in connection with the layout of the machine shop for the ideal service station. While the track and carrier are an essential part of the shop, they also are a very essential part of the service floor in general, because the hoist can be used for removing and carrying power plants to the shop, raise the front or rear end of a car, carry the rear axle, front axle, etc., of a car to the shop. In this layout the track has no curves or switches, being simply a straight line running the full length of the service floor. It could be extended around to the other side of the room, but this is hardly necessary, because the cars parked between the wash rack and electrical department are those on which minor repairs are going on. Besides the service station might be rigged out with a portable hoist such as the market affords and any removal or carrying of engines, axles, etc., to the shop done with the crane.

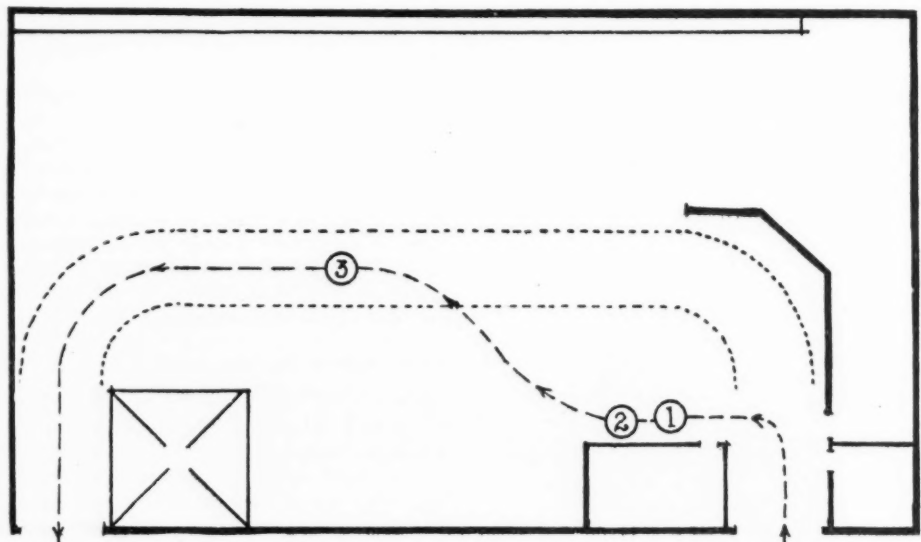
#### Shelf for Bulky Articles

Immediately behind the partition between the office, showroom and service department, there should be arranged a shelf suspended from the ceiling, which makes an excellent place for storing fenders, tops, or any other bulky articles. Access to the shelf can be had by a ladder at the end near the bench. The shelf can be made a part of the parts department, with the divisions marked the same as the bins for the smaller parts. There always are parts like rims, wheels, and equipment like that mentioned above that take a lot of room and yet must be stocked by the dealer. While these parts are not in as great a demand as some others, still they must be handy to the parts department so the customer need not wait unnecessarily.

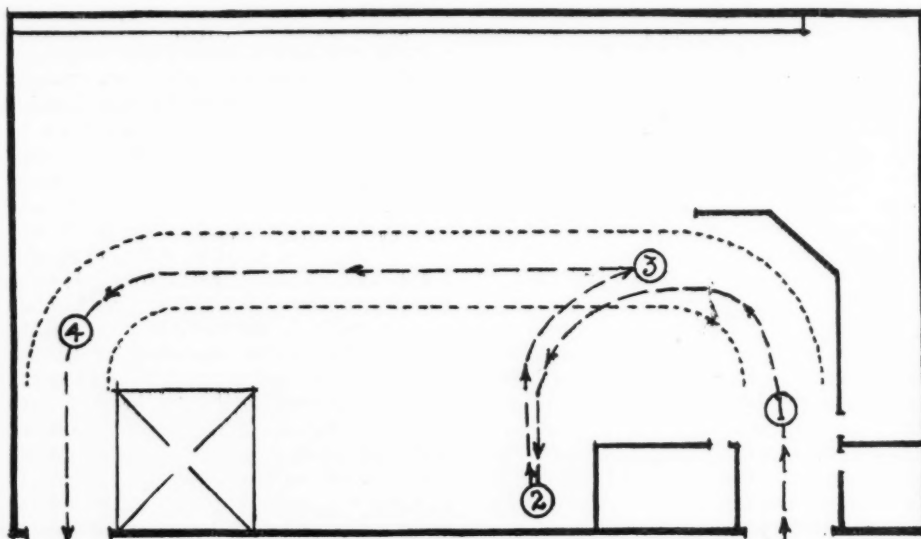
**ROUTING THROUGH A JOB**—In laying out a building for the manufacture or maintenance of any product whether it be automobiles or sewing machines there is or should be a definite reason for doing certain things. That is, one department must be laid out in correct relation with another, so that work is done along well defined lines. It is very necessary to lay out a service station, especially the service floor, so that no



Case 1



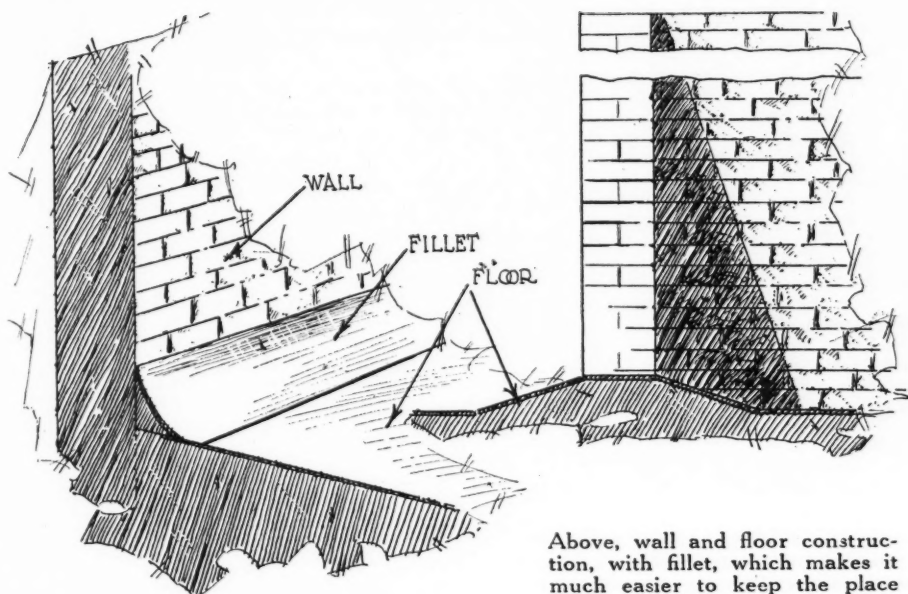
Case 2



Case 3

Diagrams illustrating by means of dotted lines the manner of handling three distinct service jobs in the building layout featured in the series on the ideal service station. The numbers 1, 2, etc., indicate positions of the car during certain service operations, except in Case 1, where 3 and 4 refer to the moving of the engine to and from the shop





Above, wall and floor construction, with fillet, which makes it much easier to keep the place clean. A slight rise in the floor at the wash rack entrance will keep water from getting onto the floor proper. Below, a series of push buttons outside the service manager's office, which bring the right man on the job without confusion



unnecessary steps are taken and that jobs can be routed through in the quickest way consistent with good results.

A lot can be learned from the chain assembly methods of our large motor car factories as regards the routine in a service station, both as to the actual steps in the repair of a car and the general way of routing through the jobs. The layout shown makes it possible to keep the work moving in a logical way from the entrance to the exit, so that no cars have to be turned around or shunted from one department to another, causing confusion. Even though there must of necessity be halts in the movement of the work, these will not

interfere with the general scheme of things, because when certain operations have been performed the car or part goes on in regular order.

The best way to explain the disposition of the departments in the accompanying plan is to take some specific instances of service work and see how the jobs are handled. Suppose we take three cases, one where a car comes in for a general engine overhaul—another for brush adjustment on the generator and a third for adjustment of pinion and ring gear in the rear axle and fresh oil in the crankcase. These three jobs shown diagrammatically would be handled in the following manner:

**Case 1**—Assume that the owner of the car has telephoned the service manager previously and upon the latter's advice the car is driven into the service station. The car is driven into a position paralleling the electrical department, where the service manager makes the inspection, if necessary with the shop foreman. An overhauling of the engine is deemed necessary to which the customer agrees. The customer and service manager or service salesman as some like to refer to him, step into the latter's office where the order is made out and signed by the customer.

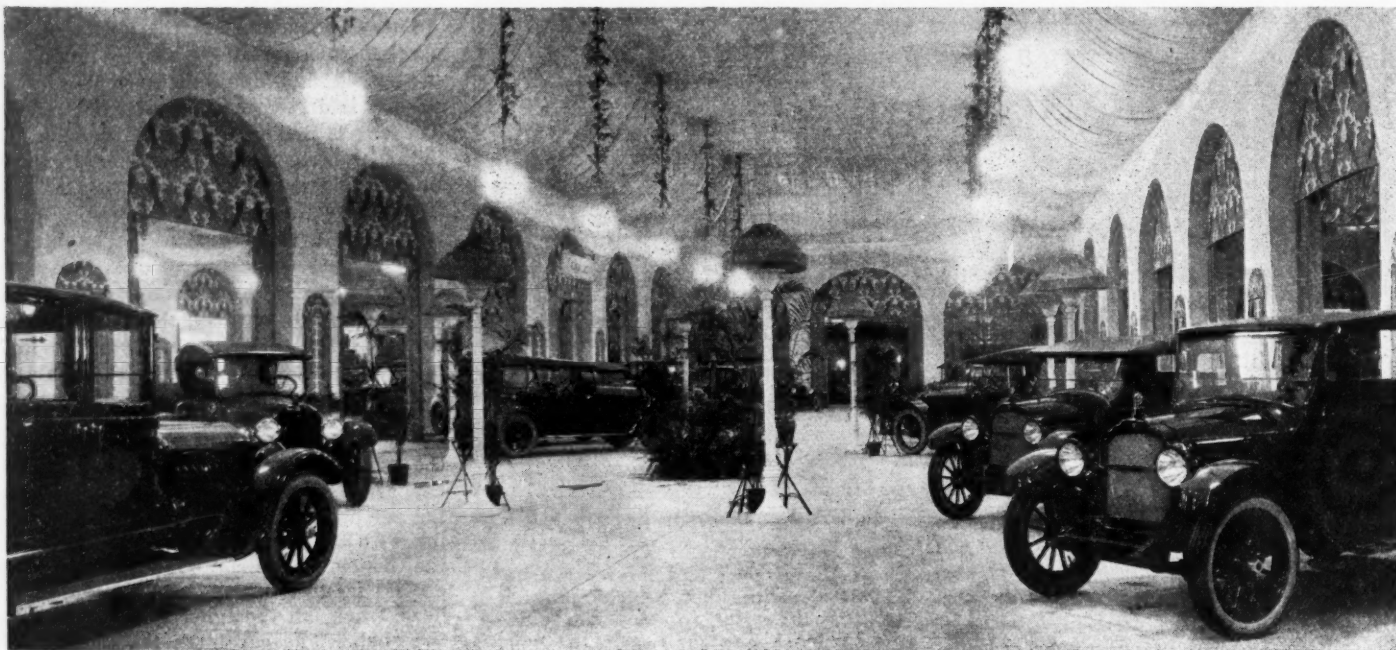
The manager ties the work order to the windshield or steering wheel of the car after which he or a helper drives the car up to the bench side of the building with the front end of the car nearest the bench. This is done so that the engine is directly underneath the overhead track, so the hoist can carry it to the shop. The car is driven into whatever space is open, preferably nearest the shop, which cuts down the time of moving the engine to and from the shop. If no space is available the car is for the moment backed into the space between the wash rack and electrical department, where it is in position to run directly across to the other side.

#### Overhauling the Engine

After it gets to the bench side the engine is loosened in the frame, such parts as the radiator, hood, etc., being placed under the bench. The engine goes to the shop via the hoist, is overhauled and comes back to the car. After it is replaced, the tester takes the car out and if things are running according to schedule, the owner will have been notified so that when the tester pronounces the job O. K. the former will have arrived and drives the car away. Cars that are taken out from the repair department are simply backed into the center aisle or runway, then driven straight out through the exit. If the work has been finished and the owner does not call for the car immediately it can be stored on the other side of the service department, where it can be driven out very easily when the time comes.

**Case 2**—Adjustment of generator brushes or putting in new brushes is a simple job and can be quickly disposed of. The car comes in and the owner tells the service manager the generator does not charge properly. The owner is directed to drive his car in front of the electrical department, the service manager having previously pressed the button for the electrical repair man. The latter puts new brushes, which by the way are but a few feet away in the cabinet mentioned in a previous article on the electrical department, the generator tested for charging rate, proper bills made out, paid by the owner and the car driven out by means of the central aisle, having been arrested in its forward movement through the room

(Continued on page 33)



Court of main exhibits, Philadelphia Automobile Show

## Closed Cars Predominate at Philadelphia Show

### Quaker City's 1920 Exhibition Brings Greatest Number of Cars on Record

PHILADELPHIA, Jan. 16—Artistry of line, beauty of finish and completeness of appointments of the many sedans,

coupes and limousines were the outstanding features on the opening night of the Nineteenth Annual Automobile Show,

held in the Commercial Museum, under the auspices of the Philadelphia Automobile Trade Association.

#### Closed Cars Predominate

It is a closed car show, that trend being as strongly emphasized as was the leaning toward open cars at the exhibition here last March. Of course, open cars are shown, but the proportion is small. And it is more distinctively an "owners' show" too, as regards automotive equipment, than was the exhibition of last spring, in that there is an increased number of clever devices of actual use to car owners and drivers, rather than to the garageman and repair-



Above, main aisle, Philadelphia Automobile Show; right, extreme right aisle at the show





man. Automotive equipment jobbers have almost been crowded out of the show.

It is in a highly decorative "salon" setting that the cars in the latest models are presented in the big museum, which is 300 by 300 ft. There are 256 cars, representing seventy manufacturers, as compared with last spring's fifty-seven, and occupying more than 90,000 sq. ft. of floor space. In all, there are eighty-three exhibitors, of which fifty-four are automobile concerns and twenty-nine automotive equipment and service institutions.

The value of the exhibits is estimated at more than \$1,200,000.

The decorations surpass any previous attempts at motor car shows here. The main exhibition hall has been transformed into a court as luxurious in appearance as that of Louis XIV, the motif being a brilliant reddish-orange bird with a peacock blue and white background, the color of the bird being reproduced in the trimmings and window boxes at cleverly simulated French windows placed at intervals in the make-believe walls formed of cream muslin and peacock blue sateen draperies. Floor lamps and ferns are grouped toward the center of the main aisle, while along the entire length of the aisles for exhibition purposes are suspended ornamental lights, their stems festooned with wreaths while many cages containing live canaries add a natural and cheerful note.

#### Cars Not Garish in Color

While the decorations are thus more brilliant and artistic than ever, the colors of the automobile bodies are, in the aggregate, not so garish as a year ago. One misses the many reds, blues, yellows and whites.

There are, however, a few roadsters and sport models more or less brightly colored. There are great arched "walls," lunettes and tapestries, arranged by an army of decorators. Narrow white lines on the corridor floors mark the spaces for the different exhibits. There are five aisles running from front to rear and an aisle at each end, the lower aisle being devoted to the rather meager display of automotive equipment, some of which also is located in the gallery at the upper end of the building, where the Third Regiment Infantry band, National Guard, plays.

There is not much "machinery" on view, not more than half a dozen stripped chassis being shown and only about three or four interior systems being isolated. Among the stripped chassis are those of the new Singer Twelve, a Roamer, a Mercer, a Stanley and an Oakland. The prices of cars range from those of a Ford runabout up to one chassis which is valued at \$15,000, however.

At this year's show the first opportunity is offered to reveal post-war influences. Car drivers who know the why and wherefore of the changes of spring suspension, increased frame

strength, devices for improving carburetion and a score of minor improvements, realize that the last two years have wrought wonders in the automotive industry. The changes are not radical, but they are essential betterments. There is a tendency noted toward lighter chassis and body construction by the use of lighter weight materials and it is noticeable, also, that this year there are fewer members that really add nothing to serviceability, safety and efficiency. Simplicity of construction and ease and economy of operation appear to have been the general aim and this, to a degree, has been accomplished.

#### Many Closed Cars in Low Priced Field

Several manufacturers who never before have produced closed types of cars, this year have entered the field, these mainly in the lower priced grades. One authority states that about half the models today are of closed or of convertible types. Non-rattling convertible models were displayed in profusion. The leaning of the entire show is toward the sedan.

As to motors, the six-cylinder shows more manufacturers making that type than any other, as exemplified at the show, although there is a generous showing of fours and eights and several twelves—the latter, of course, high-priced models.

The greatest attention has been given to body design, to engines and to chassis detail, while clutches, transmissions, steering gear and axles, already highly refined, show not many changes. There are notable improvements in universal joints and wheels. Aside from these items, the under parts of cars virtually are unaltered.

But there are impressive improvements in doors, door handles, cowl boards, instruments and fendering and devices whereby the car owner may economize with gasoline. For the most part designers have adhered to basic body lines shown last year. This means a high hood, usually with an angle at each side, the line of the angle meeting the top edge of the body. Hoods have more louvres, windshield supports are stouter and shields are much in evidence, several concerns displaying small, built-in-side-pieces attached to the windshield. It is predicted that this form in a year or so will become standard equipment.

#### Overhead Valve Engines Gain

More overhead valve engines are noted and those that are not strictly new have been improved, especially as to lubrication. Power output is greater on the average engines, though displacement does not vary to a considerable extent.

The fuel problem has brought about various alterations in manifolding and virtually every engine has some means of heating the mixture. The detachable cylinder head, vacuum fuel feed, battery ignition, six-volt separate unit starting and lighting systems are unchanged.

The exhibition's merchandising possi-

bilities have been most carefully provided for. Each exhibitor has a small desk, equipped with telephone and ample advertising literature. The dealers have put their best foot forward with their most capable salesmen and it is reported that no less than eight to ten sales were as good as closed before the end of the opening night.

As the New York show at Grand Central Palace did not close until tonight, numerous models that were exhibited there, are lacking here, but arrangements have been made to have these cars arrive here in time for Monday night.

Several companies exhibiting at the show recently have been reorganized and others have added materially to their staff of sales and service men. Service is being accentuated just now in nearly all the dealers' and distributors' advertising in the daily press and the salesmen at the show were instructed to talk "service" quite as much as the excellence of the cars and their technical improvements.

Attendance on the opening night is estimated at between 8000 and 9000, and this probably will be the smallest of the entire run, through the seventeenth. The show is open daily after tonight, from 10 in the morning till ten-thirty at night.

The show committee consists of Louis C. Block, president and chairman; H. B. Harper, secretary; J. E. Gomery, treasurer; A. E. Maltby. John H. Fassitt, L. S. Bowers, James Sweeten, Jr., and Ralph W. Cook.

The truck show follows next week, opening on Saturday, the nineteenth and extending through the night of the twenty-fourth. The truck show will be held under the auspices of the Philadelphia Automobile Trade Association, in co-operation with the Motor Truck Association of Philadelphia.

#### TO HOLD TRUCK TOUR

Columbus, Ohio, Jan. 17—An enthusiastic meeting of the Columbus Automobile Trade Association was held recently when it was decided to hold a lengthy truck tour some time in April or May. The date is to be fixed later by the committee in charge, consisting of Frank J. Girard, E. C. Brisley and J. A. Howe. This committee was named to make all of the arrangements necessary for the tour. It is planned to take in many of the cities and towns in central Ohio, including Lancaster, Newark, Mt. Vernon, Marion, Delaware and Marysville.

#### BOYCE FIRE EXTINGUISHER

In the Jan. 8 issue of MOTOR AGE, two errors appeared in the article describing the new Boyce fire extinguisher. Instead of reading "a chemical is sprayed in the engine by the melting of a fusible plug," it should have read "a chemical is sprayed on and around the engine." The manufacturing concern is known as the Boyce Veeder Corp., not the Boyce Meter Corp., and has no connection with the latter organization.



# Paris Air Show Not Commercial Success

Europeans Are Not Yet Ready to Buy Planes,  
Says W. F. Bradley

By W. F. BRADLEY

(Motor Age's Paris Correspondent)

PARIS, Jan. 16—Commercially it cannot be maintained that the aeronautical exhibition now being held in the Grand Palais, the handsome show building of Paris, is of tremendous importance. The day has not yet arrived when airplanes are sold to the masses, and the manufacturers responsible for this display doubtless do not expect to be kept busy booking orders. As an educative display, the value of the show cannot be over-rated. It contains every machine of historic interest from the early Farmans, Voisins, Antoinettes and Bleriot to the big bombers of yesterday and the aerial liners of to-morrow. Aerial ground stations are shown in models and by means of drawings; scientific instruments are found in plenty; the medical aspect of flying is given plenty of attention; all the accessories of flying, including the automobile services which must go with it, are to be found in this wonderful hall. To round off the effort, lectures are given by recognized authorities on various features of aerial navigation.

During the war it had to be admitted that aviation was dangerous. The natural risks of flying were added to, and the

risks of war put on top of that. Since the Armistice it has been endeavored to prove that flying is safe, and this can only be accomplished by figures on properly organized public services, for it will obviously be a long time before the individual can be prevented from taking risks.

The time available to prove the reliability of the flying machine and the degree of safety of aerial navigation is short. But here are some figures. From the beginning of May to the end of November of the present year regular commercial airplane services in France made 1079 individual trips, carrying 1356 passengers and 4518 parcels, and covering 274,757 miles. There was no accident of any kind during that period.

## Accidents Are Few

Between August 25th and November 1 the aerial mail service between Paris and London made 147 trips out of the 154 on the schedule. One trip could not be made owing to bad weather and 6 were not completed owing either to the

weather or to mechanical trouble. The planes covered 37,592 miles, and the average speed made was 104 miles an hour. This was an experimental period comprising a considerable amount of bad weather, and covering a district which is decidedly unfavorable for flying.

The Paris-London passenger service, on which Airco and Handley-Page machines are used, accomplished 322 trips from September 1st to December 1st, 1919. The planes carried 624 passengers and 2,876 parcels and covered a total distance of 78,031 miles. The average time for the Paris-London flight was 2 hours, 25 minutes. During this period there were no accidents to persons. During the month of December, when weather conditions were exceptionally bad, one machine crashed, killing the passenger and the pilot. This is the only fatal accident to date on civilian air lines running from France.

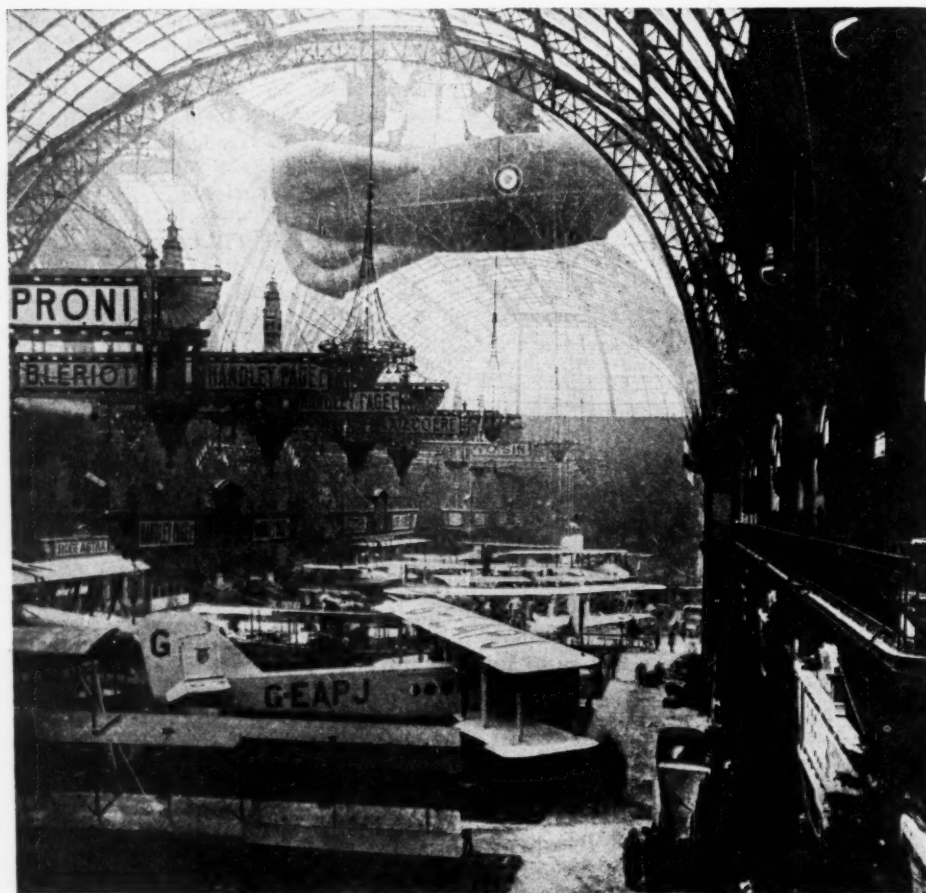
Owing to the impossibility of reaching the devastated areas in reasonable time, the postal department inaugurated an air mail service between Paris and Lille. From May 1 to October 25 the planes made 328 journeys, covering 46,875 miles, carrying 827 parcels, 1,800 bags of mail, and 13,700 telegrams which could not be transmitted in the ordinary way owing to the destruction of the wires.

## Sixty-One Landing Grounds

Another public service was from Toulouse to Rabat, in North Africa. This route passes through Barcelona and Malaga and is 1,087 miles in length. From September 1 to December 1 the operating company made 48 distinct journeys, covering a distance of 52,344 miles, carrying 19 parcels, 73 sacks of mail, and 33 passengers. The average time for each journey was 40 hours.

At the present time France possesses 61 civilian landing grounds for which a Government department is responsible. Of these 14 are landing grounds only, without sheds or supplies; 20 more are specially prepared landing grounds with sheds, but without attendants. Among these is Orly Field, the big receiving station of the American Air Service during the war. There are 20 military landing grounds completely fitted up with sheds, repair shops, supplies and skilled attendants. Five grounds are specially reserved for the Navy, and two have airship facilities. This list does not include privately owned flying grounds, of which there are about twenty in France.

For the year 1920 it is proposed to vote \$46,678,600 for civil aviation in France. This amount will be distributed among three different branches of civilian aviation: Navigation, Technical and Manufacturing.

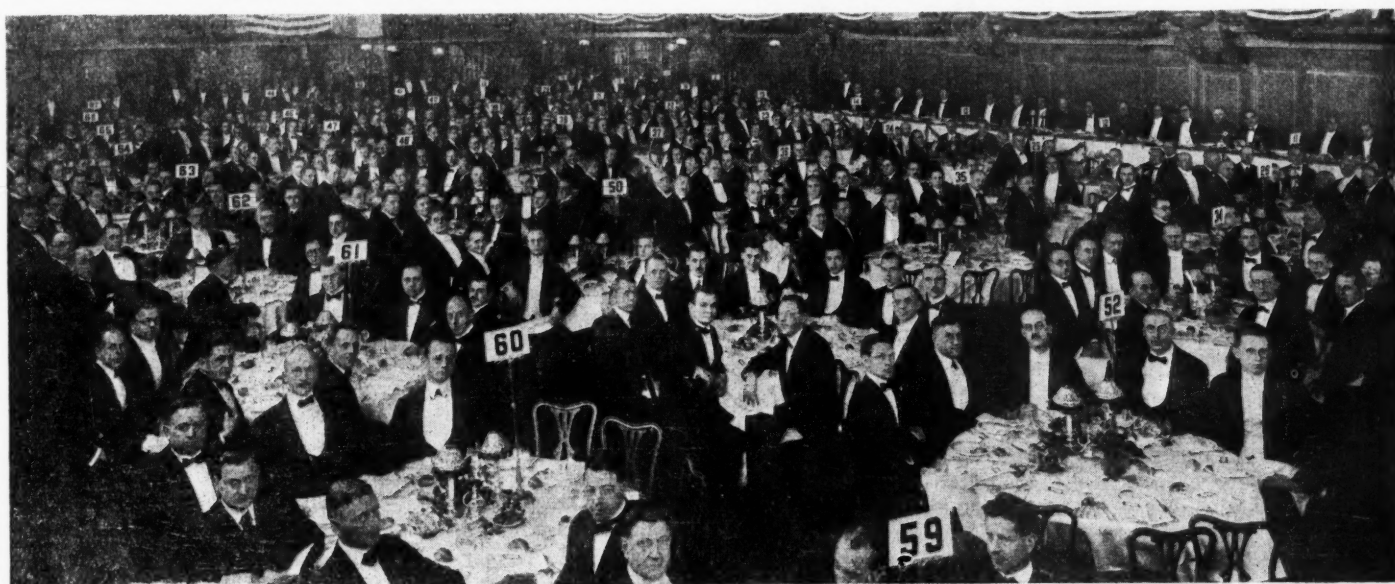


A view of the Paris air show

## They Also Ate at New York



The Rubber Men's Convention at the Waldorf was one of the best attended of the New York show



The Society of Automotive Engineers also forgot about mathematics, etc., long enough to put on the feed bag



"Service" was one of the features of the accessory exhibits at New York and the N. A. M. A. members here look as if they had had some service at their dinner





# EDITORIAL



## Missing an Opportunity

IN a story describing the automobile show in one of the largest cities in the United States, this sentence stood out to the Editor of MOTOR AGE as if it has been written in red ink.

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"THIS show is particularly an owner's event. Most of the accessories shown are for the owner, few being for the servicing of cars."

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IT struck the Editor like a blow in the face. Just when MOTOR AGE was congratulating itself that service equipment was beginning to come into its proper place in the national shows in New York and Chicago, as was shown by the large number of service accessories described in these columns in the last two weeks, to have an admission such as this is enough to give the Editor some food for thought.

## Farmers and Motor Trucks

IF I had to dispense with one, I'd let my tractor go before I'd give up my motor truck," says a prominent farmer. That's rather hard on the tractor, but it expresses appreciation of the advantage to the farmer of motorized transportation. It is a growing sense of his which is inducing the large demand for motor trucks which is coming from the farm.

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JUST what size, type and cost will be best for the farm in motor trucks still is problematical. Some form of modified commercial vehicles has found favor with certain kinds of specializing farmers, such as dairymen, for instance. But it is not safe to say that similar vehicles are the best for the average diversifying farmer.

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FARM transportation should be studied from the vantage of the farm. Some type of motor truck must be devised which will meet the multifarious conditions a motorized vehicle for the farm must meet. This is more of a problem than design-

JUST who is missing his opportunity? Is the manufacturer of service equipment who has not learned the tremendous value of these so-called "local shows," which are rapidly becoming more important than the national events? Is it a short-sighted policy of the show managers who do not realize the value of these service equipment exhibits? Or is it the dealer exhibitors who are so intent upon selling cars that they are not taking care to see that they stay sold once they are in the hands of their customers?

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CERTAIN it is, someone is missing a big opportunity. The dealer who does not sell his service at the same time he sells his cars is not going to be particularly successful. And when he goes into an automobile show without seeing that his service is represented, he is not making the most of his show's opportunities.

ers were called upon to solve in designing the ordinary commercial vehicle, and not yet has it been solved satisfactorily.

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HOWEVER, the farm demands is here and farmers are buying motor trucks. Out of the accumulated experience of hundreds and thousands of users there will evolve a practical result which will meet the average need. There is no doubt about that. The real farm motor truck will come.

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IN the mean time the motor car dealer cannot afford to stand still and watch the procession go by. Just because there does not happen to be a model which meets his ideal of what the farm truck should be is no alibi for his refusing to sell the nearest approximation. The combined faculties of adaptation of dealer and farmer will suffice for the present to fit present motor truck models to present farm needs if only they are used intelligently. The motor car dealer is rising to the situation when he sells what he has to sell and refuses to wait for inventive genius to give him something better. That will come in time.

## Putting Service on a Higher Level

IF there is any one big thing that must be done in the next few years as regards the whole automotive industry it is that of elevating the quality of service. The days are past when we looked upon the service station of the automobile dealer as simply a place to have a lot of work done on our cars for nothing. The heavy production of cars, trucks and tractors is changing the whole aspect of the service question.

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ONE of the things observed at the New York Show this year is that car manufacturers are giving more and more attention to the question of maintenance, because, after all, the biggest problem in car design is to be assured that the car will perform day in and day out with minimum attention and low upkeep expense. By that we mean the car units must be so designed and assembled that the ordinary adjustments are quickly performed, because it is the time element or labor in

the service station or repair shop that carries the bill to huge proportions.

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ASIDE from the question of designing and building motor vehicles from the standpoint of easy maintenance, there is another angle, the dealer's. The dealer must think of merchandising his service just as anything else for which there is a large public demand. Car owners must be made to realize that they may buy service in just the same way as we buy service on watches or any other article. But the chief difficulty seems to be that our motor car service stations, at least a good share of them, are not in position to give the right kind of service as yet. They must learn that the ideal service station must be run quite similar to our department stores. That is, they must be clean, display the wares properly, give the customers courteous attention, be ready to serve at all times, adopt a good policy and stick to it.



## Introducing

The two men through whose intelligent co-operation  
Motor Age is able to offer its series on

# STANDARD MECHANICAL OPERATIONS IN TRACTOR SERVICE

BY

JOHN CHARLES THORPE, M. E.,

President Thorpe American Motor Company,  
URBANA, ILLINOIS.

Born and raised in Illinois Corn Belt. Spent  
youth on Farm.

High School and University Graduate.

Special Apprenticeship in Machine Shop.

Graduate in Mechanical Engineering, University  
of Illinois and University of Michigan.

Eight years in charge of Gas Engineering Labora-  
tories in the Universities of Michigan, Wash-  
ington and Illinois.

Consulting Mechanical Engineer.

Contributor to Engineering Magazines and Pro-  
ceedings of the Prominent Engineering So-  
cieties.

Ten years a distributor of Automotive Equip-  
ment—passenger cars, trucks, tractors and  
accessories.

Specialist in Merchandising and Service Methods.

Prominent contributor to the columns of trade  
publications.

Lecturer of national repute on subjects relating  
to power farming.

Director War Courses in Tractor Operation,  
University of Illinois.

GUSTAV HOWARD RADEBAUGH,

Assistant Manager of Shop Laboratories,  
Mechanical Engineering Department,  
UNIVERSITY OF ILLINOIS.

Raised on a farm in the Corn Belt.

High School and Trade School Graduate.

Special Course in Mechanical Engineering.

Apprenticeship as Repair Machinist and Instru-  
ment Maker.

Seven years' experience as Mechanical Expert.

Instructor in Machine Shop Practice and Asso-  
ciate in Factory Management at University  
of Illinois, 1911-1919.

Special Investigator in Time Studies and Stand-  
ard Mechanical Operations in several large  
Industrial Plants in the Middle West.

Expert in the application of photography to the  
portrayal of Standard Mechanical Operations.

Extensive Contributor to Trade Papers and  
Magazines on subjects relating to "Farm  
Tools, Their Use and Care."

**STANDARD MECHANICAL OPERATIONS  
IN TRACTOR SERVICE  
BEGINNING FEB. 5**

## Ready for Chicago Show

### Final Preparations Being Made for Big Exhibition at Coliseum and Dexter Pavilion

Large Dealer Attendance is Expected for Nineteenth Annual National Event

CHICAGO, Jan. 22—Final preparations for the opening of the Chicago Automobile Show Saturday afternoon were made this week and indications point to

#### EVENTS OF SHOW WEEK

Jan. 26-27—Annual convention, National Automobile Dealers' Association. La Salle Hotel.

Jan. 27—Annual Meeting National Association of Automobile Show Managers. Congress Hotel, 2 p. m.

Jan. 27—American Motor Truck Company, "Ace" trucks, Dinner.

Jan. 28—Dodge Brothers Mid-western Dealers' Luncheon. Blackstone, 1 p. m.

Jan. 28—Federal Motor Truck Company. Dinner for dealers and district sales manager and others. Congress.

Jan. 28—Lyons Ignition Company. Dinner for representatives and buyers of jobbing houses of country. Congress Hotel.

Jan. 28—National Automobile Chamber of Commerce, Directors' Meeting, Congress Hotel, 10:00 a. m.

Jan. 28—National Highway Traffic Association convention opens.

Jan. 28—Society of Automotive Engineers. Dinner, La Salle Hotel.

Jan. 28—Yelie Motors Corporation, dealers' meeting and luncheon, Sherman Hotel.

Jan. 29—Maxwell-Chalmers dealers' luncheon and meeting, Gold Room, Congress, 12:30 p. m.

as big a success for the event here as the one a fortnight since in New York. Nearly all the decorations have been put in place and tomorrow and Saturday morning will be devoted to the installation of the exhibits. When the doors are thrown open at noon on Saturday, it is expected the last of the cars and trucks will be in their allotted position.

Preparations have been made by Chicago hotels to handle a tremendous crowd of visitors. Dealer attendance at Chicago has always surpassed that at New York and this year will be no exception to the rule. Chicago draws from the territory where more automobiles are owned than

any similar section of the world, and it is only natural that dealers should attend the Chicago show rather than more distant one in New York. While the growth of the big "local shows" in some of the other large cities of the middle west might be expected to cut down Chicago attendance, this has not proved to be the case.

As usual, the Chicago show will occupy four buildings, the Coliseum, Coliseum Annex, Greer building and the First Regiment Armory. The first three of these buildings are connected so that visitors are not obliged to go into the outside air passing from one to another while the usual covered runway has been provided between the Coliseum and the Armory, half a block away.

Trucks will be exhibited in the Dexter Park International Amphitheatre, the scene of Chicago's great livestock shows. The general feeling among automobile men is that it was unfortunate to select this building for the truck show, for it is located nearly five miles from the passenger car exhibit in one of the least desirable neighborhoods in Chicago and is rather difficult of access, especially for those who wish to go from the passenger car show to the truck exhibits. It was the only building of size available for the commercial vehicles, however.

For the benefit of visitors at the Chicago show, the most convenient means of transportation from the Coliseum to the International Amphitheatre is by way of the South Side Elevated railroad from the Twelfth street station to the Indiana avenue station where a transfer must be made to the Stockyards branch of the same road. The best street car transportation is south on either the Cottage Grove or Indiana avenue car lines, which pass directly in front of the Coliseum to the Thirty-ninth street across town line, thence transfer west to the building.

Decorations for the show this year are, as usual, by C. J. Tietzel. One of the features of the opening of the truck show will be a motor truck parade through the cities, the parade being divided in four sections so that all parts of the city may be visited.

#### 1,500 AT S. A. E. BANQUET

New York, Jan. 19—The three day Winter session of the Society of Automotive Engineers closed here Jan. 8 with the annual banquet attended by 1,500 guests. The session was marked by the presentation of important professional papers and the reports of the fifteen divisions of the Standards Committee. Although discussion was short due to a lengthy program, the meeting covered a wide field. As practically all of the reports of the standards committee divisions were accepted, the session was the occasion of much progress along these lines.

Col. J. G. Vincent was elected president to succeed H. M. Manley as president of the society. Col. Vincent is vice-president in charge of engineering of the Packard Motor Car Co., J. G. Utz, of the Standard Parts Co., is first vice-president.

## Kansas City Is Ready

### Large Number of Dealers Demonstrates Interest in Exhibition

Indications Are That Many Motor Car Men Plan to Expand Their Business

KANSAS CITY, Jan. 17—The Kansas City Automobile Show will reach its top notch this year, for the members of the Kansas City Motor Car Dealers' association intend that it shall adequately reflect the tremendous development of business in automotive equipment in this territory. The Kansas City show will be held Jan. 31 to Feb. 6, in the Overland building. For the first time in its history, the association will have adequate space for an exhibition really suitable to the proportions of the business.

The Overland building three years ago was on the south edge of Motor Row; it is now near the center of the automotive distribution district. Three floors of the building will be devoted to the show.

Trucks are on the first floor. The second floor of the show will be divided between passenger car and accessory space. Passenger cars will occupy the entire third floor of the show.

The Kansas City show has usually been important to the local dealers of the territory. While most of them have made their contracts for 1920, many, it is said, are looking for additional contracts to care for their excess orders. There has been a remarkable increase in interest among dealers, concerning truck contracts; and many of the visitors will be looking to a decision on this subject during the show. Many of the dealers, too, observing the demand for accessories by the car owners of their communities, are expected to be eager to line up incidentals—for either existing or contemplated accessory departments.

The luncheon for visiting dealers will be given Feb. 4 in "Summerland," the newly equipped dining room at the Baltimore hotel—the largest dining room in the west, and now said to be the most elaborately decorated. One thousand guests are planned for. Edwin S. Jordan, president of the Jordan Motor Co., and A. R. Kroh, promotion manager of the Goodyear Tire Co., will be the chief speakers. Six vaudeville acts are among the entertainment features arranged for the luncheon.

#### HARTFORD SHOW IS OPENED

Hartford, Conn., Jan. 17—The first annual automobile show of the recently formed Automobile Trades association of Hartford opened at the Auditorium this afternoon with every indication of a successful week's run. The exhibition is being given by the new association for the reason that space could not be obtained in the show of the Hartford

Automobile Dealers' Association, the old established body. The show was formally opened in the evening by Major J. L. Purcell of Rau-Loke Post No. 8, American Legion. The legion is to receive 25 per cent of the gate receipts.

In the short time that it has had to work, the new association has accomplished a great deal. Difficulty was experienced in finding suitable quarters. The Auditorium provides a space of 95 by 190 ft. Other difficulties were overcome and the show put on with one week's actual preparation. The admission has been set at twenty-five cents plus the war tax through members of the American Legion are admitted free.

The following firms have car exhibits: Puritan Motor Sales Co., Jordan and Stewart; Robert J. Flynn, Inc., Westcott; Beck's Garage, Columbia; L & H Motor Co., Locomobile and Hupmobile; Daniels Motor Sales Co., Daniels 8; Morgan Garage, Templar; Stutz Motor Sales Co., Stutz; Linden Garage, Clydesdale and Moon; Colton, Johnson, Western Motor Co., Dort and Moline Knight, and Jones Garage, Lexington.

## Pacific Coast Show Big

All of the Main Displays from the New York and Chicago Show to Be Exhibited

Attracting Attention as One of the Largest Expositions of the Motor Car Industry

SAN FRANCISCO, Jan. 20—Over-shadowing all similar events in the history of the west, the fourth annual Pacific Automobile Show will be held here during the week beginning Feb. 21. The show, which is to be given under the auspices of the Motor Car Dealers' Association of San Francisco, will be staged in the huge Exposition Auditorium. Arrangements for the first post-war general "get-together" of Pacific Coast motor dealers and fans are being completed rapidly by G. A. Wahlgreen, the show manager.

Ranking as one of the largest expositions of the motor car industry, this year's show is attracting the greatest attention and support. Assurances have been received by Manager Wahlgreen that all of the feature exhibits displayed at the New York and Chicago shows will be rushed to this city by express as soon as they have served their purpose at the former shows.

Requests for exhibition space have been received already from forty-four individual distributors and dealers, representing fifty-four separate lines of automobiles, and from forty-two representatives of fifty-five different lines of trucks, tractors and trailers. In addition, sixty exhibitors have made reservations in the accessory department, which will be a feature of the show.

## Sales Methods Compared

Difference Between Eastern and Western Plans to Be Shown at Chicago Show

N. A. D. A. Program Calls for Many Interesting Papers to Be Read at Convention

ST. LOUIS, Jan. 16—Eastern methods of retailing automobiles will be compared with Western at the third annual convention of the National Automobile Dealers' association at Chicago, Jan. 26 and 27, according to announcement here today by Harry G. Moock, secretary and general manager of the dealers' association, who has just completed the program for the event.

The East will be represented by H. B. Harper of the Overland Harper Co. of Philadelphia, and the West by Clyde Herring of the Herring Motor Car Co. of Des Moines, Iowa. Both of these men stand in the forefront of the industry. Theirs will be the only two formal addresses of the convention. Herring's address will be entitled "The Retail Automobile Dealers' Establishment"; Harper's "Selling the Passenger Car." Both these addresses will be made Monday afternoon, Jan. 26.

Monday morning will be devoted to reports and business. Monday night will see the dealers' second annual trade frolic, for which E. E. Peake of Kansas City has been named as toastmaster. A forum will be the feature of the Tuesday morning session. Leaders will be allowed ten minutes to present the subject. Discussion following will be for twenty minutes, no speaker to be allowed more than five minutes. In this way it is hoped to get the views of a half hundred men on some particular phase of the industry.

The forum subjects and their leaders are "Why the Townsend Bill," Pyke Johnson, N. A. D. A., Washington, special highway representative leader, "The Service Manager's Job," P. E. Chamberlain, Denver, Colo., "What We Must Do for the Trade Schools," F. W. A. Vesper, St. Louis, "The 1920 Way of Selling Motor Trucks," N. H. Cartinhour, Indianapolis, "The Future of Successful Automobile Merchandising," J. O. Munn, Toledo.

The afternoon of Tuesday will be devoted to changes in the charter to give the association ten directors instead of nine and to provide for their election for three years instead of one year.

### TORONTO SHOW ASSURED

Toronto, Ont., Jan. 20—It is almost an assured fact that there will be an automobile show in Toronto this winter, about the middle of next month. Although no suitable place has yet been secured the promoters are endeavoring to obtain the use of the Armouries, on University Avenue, for the event. G. M.

MacWilliam, secretary of the Toronto Automobile Trade association, is in New York this week attending the motor shows there with a view of getting ideas and plans to be incorporated into the Toronto show. Since the by-law to assist build a big live stock arena at the Exhibition grounds was approved by the citizens last week, motor trade circles are looking forward to the time when a monster winter automobile show can be staged in the proposed structure.

### N. A. D. A. GETS RIGHT OF WAY

Chicago, Jan. 18—Assurances have been given by leading automobile manufacturers that the National Automobile Dealers' association will be given the right of way for their third annual convention which is to be held Jan. 26 and 27 in conjunction with the Chicago Automobile Show. At first it was feared that some of the manufacturers might stage dealer conferences or dinner in conflict with the dealers' convention, but Harry C. Moock has received word from most of the dealers that this will not be done.

## Cleveland Show Now On

This Exhibition Inaugurates a Five-Show Program for Cities in Vicinity

Detroit is Preparing to Open Its Automobile Exposition February 14

DETROIT, Jan. 17—Detroit automobile and truck manufacturers today turned their attention to the annual exhibition at Cleveland, inaugurating a five-show program in which Detroit cars will be conspicuous. All of the show cars which were on exhibition at the New York event will be displayed in Chicago and Detroit and in many instances manufacturers will substitute them for the stock models at Cleveland, Toledo and Louisville.

Reports from Cleveland are to the effect that the show opening today will be the greatest in the history of the industry in that city while Toledo appears determined to uphold her reputation as the second largest automobile center in the world in the preparations for the exhibition which opens there Feb. 2. The popularity of Detroit cars in Southern Ohio, Indiana and Kentucky will be evinced in the Louisville show which includes in its clientele residents of the richest sections of the three states. The Louisville show will open Feb. 23.

The Detroit offering naturally takes rank with the New York show and by many is looked upon as the logical location for a display of all that is best in motordom. Genuine surprises are promised for the Detroit show, which will open Saturday, Feb. 14, and in the fact that some models not completed in time for display at New York will make their



bow to the automobile lover at the Detroit exhibition, the promoters feel that it will rank favorably with the display at Grand Central Palace.

Members of the Detroit Automobile Dealers' Association were allotted their space Wednesday and the allotment to non-members was made yesterday, practically all of the show space in the big Ford service building, at Woodward avenue and Grand boulevard, having been parceled out. Five floors of the structure will be used to house the comprehensive exhibit of automobiles, trucks, tractors and equipment. The splendid location is secured through the generosity of the Fisher Body Corporation.

#### MUST KEEP REPAIR PARTS IN SASKATCHEWAN

Regina, Sask., Jan. 16—In the Provincial Legislature the motion of T. H. Gary, Yorkton, Sask., asking the government to bring down legislation requiring automobile selling companies to keep a stock of repairs in the province was carried unanimously and it is expected a bill will be introduced in the house shortly. Suggestions were made that the legislation should also give the government control of prices for repair parts and require companies ceasing to manufacture and sell automobiles to protect their purchaser for a period of years thereafter.

## Boston Gets Many New Cars as Result of New York Show

BOSTON, Jan. 20—As a result of the New York show several new cars will be seen in Boston in the near future. There were more dealers, salesmen, accessory men at New York than ever before in the history of the shows. And they stayed longer than before. They wanted to get first hand information on prices, and learn about what was coming to New England.

Sherwood Hall, Jr., who has the Hupmobile took over the distribution of the Argonne car. He will market the two at his new place on Commonwealth avenue. Hardy Mitchell and Clarence Dow, former Cadillac man, signed up the Lincoln just before leaving for New York.

Frederick Graves, formerly with Packard in Boston, has taken the R. & G. Knight, formerly the Moline Knight, for New England. Frederick J. Caldwell, who had the Mercer, and now has the Templar, has taken the Sunbeam for New England.

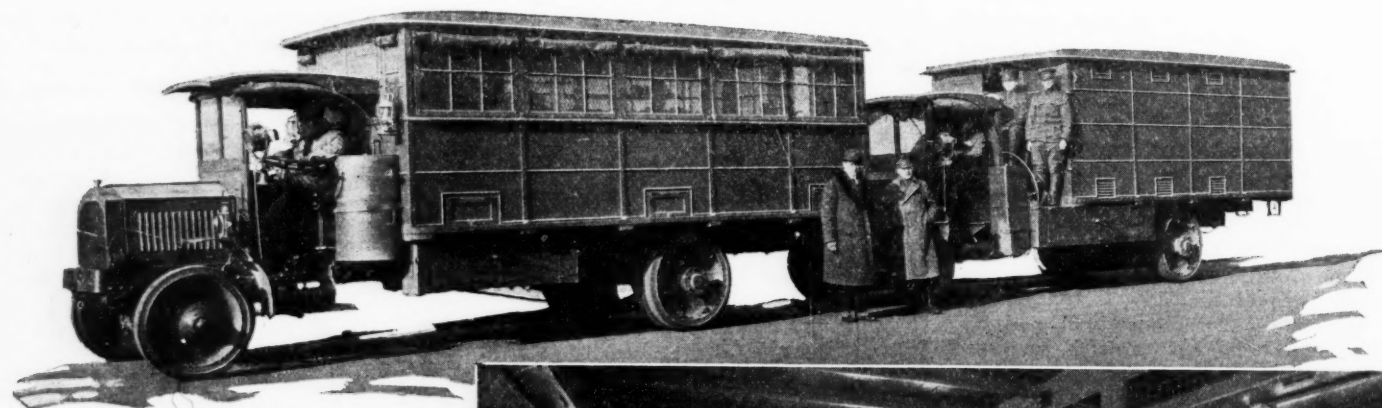
Roger Jouett Gilmore, formerly with Packard at Philadelphia, and later with the New York Packard Co. is the head of the company handling the Mercer in Boston now.

The La Fayette agency was not settled at the show, but it will be shortly, it is expected. Rumor had some names as signing it up, but these men denied it. A. H. Sowers, of the Lexington, said he had his eye on a car and might be able to make an announcement in a few days.

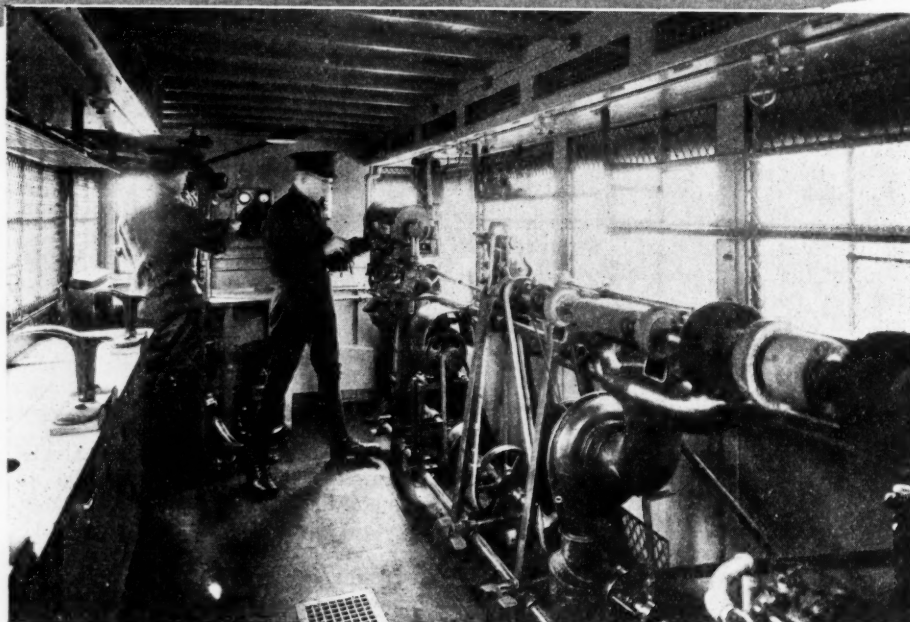
The H. C. S. car, put out by Harry Stutz, is to be handled here, and according to reports Tommy Forbes is going to come to Boston as the man. Walter Hennigan, formerly with Paige Detroit, and now handling trucks, is reported to have taken on the Stephens Six. R. R. Ross, who had the Fiat until recently, was looking over the lines, but did not see anything that appealed to him.

#### DONATE PARK FOR MOTORISTS

Valentine, Neb., Jan. 16—Valentine, which is one of the main traveled tourist routes for the west has set aside a tract of land for a motor car camp for overland tourists. The motorists may stop in Valentine and rest as long as they wish. There is a good sized lake in the park so the dusty motorist can swim, go bathing or fishing, whichever he may desire.



Uncle Sam believes in being up to date in everything possible and has motorized his shoe repair shops for the army. The truck shown above is fitted with a complete modern shoe repair shop capable of repairing 800 shoes a day. An interior view of the motorized shop is shown below



# Implement Conferences Have Proved to be a Great Farce

MINNEAPOLIS, MINN., Jan. 15—"We have sold all the tractors you made last year, so what more can you want? You ask us if we retail implement dealers are measuring up to expectations as sellers of tractors and power farming machinery? Well, aren't we? What else do you expect? We've sold the tractors and that is proof that we are measuring up."

That, or words to that effect, is what the retail implement dealers are saying to representatives of the Sales Managers' Division of the National Implement & Vehicle association at the dealer conferences which are a feature on the program of every convention of retail implement dealers this year. Such a conference occupied all of the forenoon yesterday at the dealers' convention here and above is about what the dealers told the sales managers about measuring up.

While all the time a tractor manufacturer was sitting on the floor of the convention who just had got through paying \$132,000 as the cost of 5000 service calls his factory and branch houses service organization had taken care of during the year 1919, calls every one of which came through the retail dealer.

## Service, Not Sales, Is Lacking

And that, in reality, and not the fact of having sold the tractors, tells the story of whether the retail dealers have been measuring up as they ought to have done.

Why is it that this fact, and similar facts quite as much to the point, are not presented to the dealers? Nobody knows.

So far as getting anywhere is concerned these convention conferences are a good deal of a farce. The sales managers talk nothing but generalities and give no specific definition of what they mean by the word "expectations" in the question they are asking.

The dealers, in turn, assume that if the annual output of tractors is sold the manufacturers have no right to expect anything else at their hands. They show great self complacency with this fact. Their complacency, too, is of the egotistic type which assumes that if the tractors have been sold then it is they and nobody else who has sold them, entirely ignoring the fact that in reality they probably did not sell half of them.

The very fact that the sales managers asked for these conferences for the distinct purpose of asking the dealer if he is measuring up is proof that there is a reasonable doubt about the matter in the minds of the manufacturers. If there is such a doubt then why in the name of common sense don't they come out into the open, run off the camouflage,

and tell the dealers plainly and bluntly wherein it is the latter are failing to make good as acceptable tractor dealers. Nobody knows why they don't.

Surely there are facts enough. Everybody in the tractor business who is at all acquainted with the selling of tractors knows of such facts as the one already instanced, where 5000 service calls at \$26.40 per call, were demanded from one tractor manufacturer. And everybody who knows anything about the nature of calls for service is cognizant of the fact that the dealer should have been prepared and competent to take care of the larger part of them without asking for the assistance of the manufacturer at all and costing the latter \$132,000.

Therefore, it is pertinent to ask why the sales managers, who surely must know these things, do not come out plainly and tell the dealers that the mere selling of the tractors is not going far enough, but that they must equip themselves to render the necessary service and then render it. Until the sales managers do this no worth while progress will ever result from the sort of conferences which have been held this year. All they will succeed in doing will be to confirm the average dealer in his present attitude that he is doing all that can reasonably be expected of him to do when he sells the tractors and that he is entitled to more pay than he is

getting now for the tractors being sold.

The dealer thinks he is going the whole distance. The manufacturer thinks he is not. There is a difference of opinion about the interpretation of "expectations," and there will continue to be until there is some plain talking done by somebody.

In the meantime there are dealers who are measuring up and it is they who will get whatever concessions there are to be had during the future in the way of better discounts and contract conditions. Therefore, these latter have no occasion to worry.

The Minnesota convention was well attended, the largest number of dealers being present than at any meeting the association ever has held. Great interest was taken in the future of the farm power equipment business, but the general discussions were a good deal like the sales managers' conference, they did not get anywhere much. There was no attempt made for an exhibit as the industrial exposition comes within the next two weeks and practically all of the dealers will be back in Minneapolis for that.

## TO LIST ST. LOUIS "DEAD BEATS"

St. Louis, Jan. 16—Every "dead beat," every "slow pay," and every "unreasonable customer," who buys tires in St. Louis Tire Dealers' association, the newest of the automotive associations in St. Louis. This credit bureau will be installed in the office of the secretary, Capt. Robert E. Lee. The association also has decided to watch out for passers of bad checks, and prosecutions will follow such actions. Indorsement for the plan to form the Automotive Industries' association of St. Louis was given.

## Atlanta Dealers Believe in Carload Lots



Atlanta dealers believe thoroughly in railroad lots shipments, so they shipped a carload lot of themselves via the Atlanta Constitution Special, to the New York Automobile Show. The trip was arranged by P. A. Megahee, executive secretary of the Atlanta Automobile Dealers' Association and William L. Mathers. So successful did it prove that the dealers plan to attend future shows in the same way



**G. M. C. NOW A \$1,000,000,000 CONCERN**

New York, Jan. 16—Stockholders of the General Motors Corp., at a meeting in Wilmington, Del., Jan. 6, approved the new capitalization plan for the issuance of non-par stock and its exchange, 10 for 1, for the existing issue on May 3, 1920.

The new plan authorizes 6,100,000 shares of capital stock, preferred and debenture, at \$500 a share and \$50,000,000 common of nominal par value. This makes the General Motors a \$1,000,000,000 corporation—the largest industrial corporation in the world.

The new capitalization will consist of the following amounts: 200,000 shares preferred stock, par \$100; 900,000 shares debenture stock, par \$100; 5,000,000 shares 7 per cent debenture stock, par \$1,000; 50,000,000 shares common stock without par value.

**DEFINE TAX FOR PASSENGER CARS**

Washington, Jan. 17—The special tax applying on passenger automobiles operated for hire and which is \$10 for each automobile of a seating capacity for two and not more than seven and \$20 for each automobile with a seating capacity for more than seven, is to be based upon the number of cars operated or rented and the seating capacity of each car, and is not to be computed upon any average number of cars or seats, according to a decision made by the Internal Revenue Office. The tax attaches to a person operating a hotel bus for carrying passengers between railroad stations and hotels if a separate charge is made for this service.

The tax should be paid for automobiles used for carrying passengers, based upon the seating capacity of the whole car, unless a portion of it is set off and so designed that it can not be readily used for seating passengers.

# John F. Dodge, Motor Car Maker, Victim of Pneumonia

NEW YORK, Jan. 16—John F. Dodge, Detroit automobile maker, who had been ill for a week with pneumonia in his apartments at the Ritz-Carlton, died tonight. He was unconscious toward



the last and unable to recognize his wife and daughters, who were with him.

His brother, Horace E., ill at the same hotel with pneumonia, is recovering and is expected to be out again within a fortnight.

The Dodge brothers came here to attend the automobile show.

John F. Dodge was born fifty-four years ago in Niles, Mich. In their father's shop, he and his brother, Horace, learned their trade as machinists after they had attended the Niles schools.

From their apprenticeship, until the day when, by a coincidence, they both fell ill of pneumonia in New York, the brothers were inseparable in work and play, so it is impossible to relate the history of one without mention of the other.

The two brothers built the first bicycle ever seen in Niles. In Detroit, in 1901, they established a machine shop on Monroe avenue, starting with machinery taken in payment of a debt, and employing eleven men.

About the same time Henry Ford had completed his experiments in automobile building and was trying to organize a company to begin manufacture. In 1902, the Henry Ford Automobile company was organized, and John and his brother each took a \$5,000 interest in the business, the stock being paid out of their profits in the manufacture of 650 chassis. That formed the beginning of the Dodge brothers' connection with Henry Ford.

Mr. Dodge's original investment of \$5,000, paid out of profits on a shop job, had grown to \$12,500,000, when the Fords finally bought out the minority stockholders last July, and that was the sum he received for his holdings and added to a fortune that is estimated at more than \$50,000,000.

## Baltimore Gets New Motor Vehicle Manufacturers

BALTIMORE, MD., Jan. 16—Announcements of interest to the motor industry have just been made in this city, which provide for the establishment of several automobile factories as well as a plant to manufacture parts for motor cars and tractors.

The Steinmetz Electric Motorcar Corp., a \$2,000,000 concern, incorporated under the laws of Maryland, headed by Charles P. Steinmetz, the widely known electrical expert, is one of the companies. Besides Mr. Steinmetz, the incorporators include W. F. Ham, president of the Washington Electric Light & Power Co.; Lindsey Hopkins, director of the American Hide & Leather Co. and vice-president and director of the Santa Cecilia Sugar Co.; A. Robert Elmore, of Morehead and Elmore, Washington, a member

of the New York stock exchange; Guy Scott, president of the Continental Trust Co., Washington, D. C.; J. P. Story, Jr., director of the American Hide and Leather Co., and director of the Commercial National Bank, Washington, D. C.; James Piper, of Piper, Carey & Hall, attorneys, says a site is under consideration near the city and an announcement may be expected very shortly as to the exact location.

The Kennedy Corp., capitalized for \$2,000,000, under the Maryland laws, is headed by Joseph P. Kennedy, who is president of the Baltimore Malleable Iron & Steel Co., and the Kennedy Foundry Co., but the new company will not be connected with the two latter companies. The factory will be established at Curtis Bay, now a part of Baltimore.

**WEYLAND HEADS CASE SALES**

At a meeting of the board of directors of J. I. Case Plow Works Co., the resignation of L. N. Burns, vice-president in charge of sales was accepted. G. C. Weyland, formerly general sales manager of the company, was elected to succeed Mr. Burns as a member of the board and to the office of vice-president in charge of sales. Mr. Burns expects to take a needed vacation before taking up other plans which he has in mind.

**HANDLEY-KNIGHT CAR PROMISED BY SUMMER**

New York, Jan. 16—Organization of the Handley-Knight Co. a \$1,000,000 corporation to manufacture a four-cylinder Knight car, was announced here today by J. I. Handley, of Kalamazoo.

Plans for a plant in Kalamazoo, where the company has purchased 40 acres, have been made. It is expected that this first unit will accommodate a production of 30 cars a day. For convenience in handling the preparatory work of get-

ting under way, temporary offices for the engineering and purchasing departments will be located in Detroit.

Only a portion of the authorized issue of stock has been sold. This was disposed of in less than 20 min. and was heavily oversubscribed.

The board of directors includes: W. E. Upjohn, Kalamazoo; S. E. Campbell, President of the First National Bank of Kalamazoo; Henry Den Bleyker, Kalamazoo; H. B. Parker, Michigan City and H. C. Howard, counsel, also of Kalamazoo. Walter Stewart, Toledo, former treasurer of the Willys-Overland Co.; Martin V. Kelly, president of the Martin V. Kelley, Advertising Agency and J. I. Handley, who now severs his connection with the Willys-Overland Co.

Officers of the company are J. I. Handley, president; W. E. Upjohn and C. S. Campbell, vice-president, and W. O. Otis, secretary-treasurer.

The company has arranged for its license for Knight motors from the Knight-American Patents Co. Arrangements have been made with the Willys-Overland Co. for the manufacture at its Knight motor plant at Elyra, O., of the four-cylinder knight motors. One chassis will be built for a variety of body types.

Quantity production is expected by mid-Summer.

#### BUFFALO TO BUILD NEW ENGINE

Buffalo, Jan. 16—Manufacture of the Elbridge automobile engine on a large scale is soon to be begun in Buffalo by the Elbridge Automobile Corp., for many years manufacturers of marine engines. A company has been formed and will begin operation early in 1920, it is announced. The firm is said to have on its books applications for quotations on \$27,000,000 worth of motors.

Directors of the corporation are Francis C. Owen, president and general manager; Edward J. Bernhard, treasurer; Charles F. Feine, secretary; F. C. Muller and J. C. Tom, directors. Offices have been opened in the Mutual Life building.

#### RAUCH & LANG, INC., CHANGES HANDS

New York, Jan. 20—Announcement was made in New York today, of the purchase of Rauch & Lang, Inc., of Cleveland, by Ray S. Deering, president of Stevens-Duryea, and the formation of a company by him to manufacture Rauch & Lang electric cars, in a factory to be erected in Chicopee, Mass., adjacent to the Stevens-Duryea plant.

The company will locate on an 18-acre tract just purchased on which it is proposed to erect a factory which will permit of greatly increased production over the present figures. Associated with Deering in the organization of the new company is George C. Gill, president of the Holyoke National Bank. The personnel of the company is to be announced.



# The Motorists' Bookman

## THE AUTOMOTIVE EDUCATIONAL BUREAU

Railway methods of home study education of ambitious workmen have been applied to the automotive field by the Automotive Educational Bureau, Omaha, Neb. This bureau is an outgrowth of the Railway Educational Bureau established on the Union Pacific Railroad by the late E. H. Harriman, some years ago. Its function was to train men for efficient service to supply the increasing demand for help in all departments of the railway, and provide methods which would bring to light the ambitious, industrious and efficient employee who should be selected for promotion. The Railway Educational Bureau outgrew the narrow limits of one road and its service has become available to employees of eighty of the principal railroads of the country.

The Automotive Educational Bureau is modeled on lines similar to those which have made the Railway Educational Bureau successful. In preparation of its text books for home study work and in handling the students the methods which experience in railway work indicated gave the best results were employed. A feature of the plan is that lessons are assigned based on the subscriber's previous education and experience, so that to an extent the service is individualized.

## THE MOTOR TRUCK DEVELOPS PAYING FISH INDUSTRY

The motor truck is practically responsible for the development of the well paying fish industry on the Pacific Coast. The bags of fertilizer are easily taken care of, but the transportation of oil from the small coastal towns has been a problem.

One of the largest fish products companies is found in Monterey—the Mecca of the Pacific Coast fish industry. San Francisco, 150 miles away, offered better railroad facilities than Monterey, and big Federal trucks make mountain trails to Frisco almost every day. The oil-carrying trucks are equipped with especially constructed steel bodies controlled by mechanical dumping-hoists.

Fish waste products support several

companies in Monterey and their plants have expanded since the war forced ideal transportation. Fish products are also bringing prosperity to our eastern cities.

## AUTOMOTIVE WIRING MAUAL REVISED

The book of wiring diagrams, published by the Automotive Publishing Co., Chicago, soon to be out in its 1920 form. It is along the same lines as the previous issue but contains many additional drawings, principally those of 1920 models. Also a number of additional internal diagrams. The book will contain considerably over 700 pages and over 800 drawings, in the characteristic blueprint form.

In addition considerable information of value relative to the make and style of batteries used on various cars. Also the model of generator, starting motor, etc., which the present manual does not contain.

## TRUCK TIME RECORD BOOK

The Service Recorder Co., maker of travel recorders for commercial vehicles at Cleveland, Ohio, is distributing a limited number of copies of the service time record book for motor trucks, which is a series of forms to give the truck owner the necessary charts which will make it easy for him to keep a graphic record of truck performance. A simple curved line, rising and falling as the actual running time of his truck increases or decreases, gives him a picture of the efficiency of his truck for an entire month at a glance. Another chart, by means of twelve vertical columns, enables him to present the activity of his truck for an entire year at a glance. Two or more trucks can be compared for as long a period as a year in this way and the truck owner can tell in a moment which truck is getting most of the work, and which truck is "taking it easy."

The busy executive does not have time to review in detail all the facts and figures of the month's performance. Then, again, details considered too closely are often misleading. He is interested, not in little details, but in general tendencies.

## FIRE DESTROYS OAKLAND FINISHING PLANT

Buffalo, Jan. 16—Damage amounting to \$400,000 was done in the Buffalo Terminal Warehouse, occupied as a finishing plant for Oakland automobiles, on Jan. 8. Between 50 and 60 Oakland chassis were being equipped with closed car bodies were so badly damaged by the fire and water that it is believed they will be worth little unless entirely rebuilt.

About 250 closed car bodies were destroyed by the fire.

The finishing plant is operated by Sturtzer & Co. of Buffalo for General Motors. Half of the 150 persons who were in the building when the fire broke out at 8 o'clock in the morning, escaped by climbing down a fire escape. More than half the entire Buffalo fire department was kept busy fighting the fire for more than eight hours. The lower Seneca street business section was menaced.



# Passenger Car Exhibitors at the Chicago Show

NAME	COMPANY AND ADDRESS	NAME	COMPANY AND ADDRESS
Allen.....	Allen Motor Co., Columbus, O.	Maxwell.....	Maxwell Motor Co., Detroit, Mich.
American Beauty.....	Pan-American Mot. Corp., Decatur, Ill.	Mercer.....	Mercer Automobile Co., Trenton, N. J.
Anderson.....	Anderson Motor Co., Rock Hill, S. C.	Metz.....	Metz Co., Waltham, Mass.
Apperson.....	Apperson Bros. Auto Co., Kokomo, Ind.	Milburn Electric.....	Milburn Wagon Co., Toledo, Ohio
Auburn.....	Auburn Automobile Co., Auburn, Ind.	Mitchell.....	Mitchell Motors Co., Racine, Wis.
Biddle.....	Biddle Motor Car Co., Inc., Philadelphia	Moline-Knight.....	Root & Van Dervoort Eng. Co., East Mo- line, Ill.
Briscoe.....	Briscoe Motor Corp., Jackson, Mich.	Monitor.....	Monitor Motor Car Co., Columbus, Ohio
Buick.....	Buick Motor Co., Flint, Mich.	Monroe.....	William Small Co., Indianapolis, Ind.
Cadillac.....	Cadillac Motor Car Co., Detroit, Mich.	Moon.....	Moon Motor Car Co., St. Louis, Mo.
Case.....	J. I. Case T. M. Co., Racine, Wis.	Nash.....	Nash Motors Co., Kenosha, Wis.
Chalmers.....	Chalmers Motor Co., Detroit, Mich.	National.....	Natl. Motor Car & Vehicle Corp., Indian- apolis, Ind.
Chandler.....	Chandler Motor Car Co., Cleveland, Ohio	Oakland.....	Oakland Motor Car Co., Pontiac, Mich.
Chevrolet.....	Chevrolet Motor Co., New York, N. Y.	Oldsmobile.....	Olds Motor Car Co., Lansing, Mich.
Cleveland.....	Cleveland Auto Co., Cleveland, Ohio	Olympian.....	Olympian Motors Co., Pontiac, Mich.
Cole.....	Cole Motor Car Co., Indianapolis, Ind.	Overland.....	Willys-Overland Co., Toledo, Ohio
Columbia.....	Columbus Motors Co., Detroit, Mich.	Owen-Magnetic.....	Baker R. & L. Co., Cleveland, Ohio
Comet.....	Comet Automobile Co., Decatur, Ill.	Packard.....	Packard Motor Car Co., Detroit, Mich.
Commonwealth.....	Commonwealth Motors Co., Chicago, Ill.	Paige.....	Paige-Detroit Motor Car Co., Detroit
Crow-Elkhart.....	Crow-Elkhart Motor Co., Elkhart, Ind.	Paterson.....	W. A. Paterson Co., Flint, Mich.
Davis.....	Geo. W. Davis Motor Car Co., Richmond, Ind.	Peerless.....	Peerless Motor Car Co., Cleveland, O.
Detroit Electric.....	Anderson Electric Car Co., Detroit, Mich.	Pierce-Arrow.....	Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Dixie Flyer.....	Dixie Motor Car Co., Inc., Louisville, Ky.	Pilot.....	Pilot Motor Car Co., Richmond, Ind.
Dodge Brothers.....	Dodge Brothers, Detroit, Mich.	Premier.....	Premier Motor Corp., Indianapolis, Ind.
Dorries.....	Dorris Motor Car Co., St. Louis, Mo.	R. & V. Knight.....	Root & Van Der Voort Eng. Co., Moline, Ill.
Dort.....	Dort Motor Car Co., Flint, Mich.	Reo.....	Reo Motor Car Co., Lansing, Mich.
Elcar.....	Elkhart Carriage & Motor Car Co., Elk- hart, Ind.	Roamer.....	Barley Motor Car Co., Kalamazoo, Mich.
Elgin.....	Elgin Motor Car Co., Chicago, Ill.	Saxon.....	Saxon Motor Car Corp., Detroit, Mich.
Fiat.....	F. I. A. T., New York City	Sayers.....	Sayers & Scovill Co., Cincinnati, Ohio
Franklin.....	H. H. Franklin Mfg. Co., Syracuse, N. Y.	Scripps-Booth.....	Scripps-Booth Corp., Detroit, Mich.
Grant.....	Grant Motor Car Corp., Cleveland, Ohio	Standard.....	Standard Steel Car Co., Pittsburgh, Pa.
Haynes.....	Haynes Automobile Co., Kokomo, Ind.	Stanley.....	Stanley Mot. Carriage Co., Newton, Mass.
Hollier.....	Lewis Spring & Axle Co., Chelsea, Mich.	Stearns-Knight.....	F. B. Stearns Co., Cleveland, Ohio
Holmes.....	Holmes Automobile Co., Canton, Ohio	Stephens Six.....	Moline Plow Co., Stephens Motor Branch, Moline, Ill.
Hudson.....	Hudson Motor Car Co., Detroit, Mich.	Stevens-Duryea.....	Stevens-Duryea Co., Chicopee Falls, Mass.
Hupmobile.....	Hupp Motor Car Corp., Detroit, Mich.	Studebaker.....	Studebaker Corp., South Bend, Ind.
Jackson.....	Jackson Automobile Co., Jackson, Mich.	Stutz.....	Stutz Motor Co., Indianapolis, Ind.
Jordan.....	Jordan Motor Car Co., Cleveland, Ohio	Templar.....	Templar Motors Corp., Cleveland, Ohio
King.....	King Motor Car Co., Detroit, Mich.	Velle.....	Velle Motors Corp., Moline, Ill.
Kissel Kar.....	Kissel Motor Car Co., Hartford, Wis.	Westcott.....	Westcott Motor Car Co., Springfield, Ohio
Leach.....	Leach-Biltwell Co., Los Angeles, Calif.	Willys-Knight.....	Willys-Overland Co., Toledo, Ohio
Lexington.....	Lexington Motor Co., Connersville, Ind.	Winton.....	Winton Co., Cleveland, Ohio
Liberty.....	Liberty Motor Car Co., Detroit, Mich.		
McFarlan.....	McFarlan Motor Co., Connersville, Ind.		
Maibohm.....	Maibohm Motors Co., Sandusky, Ohio		
Marmon.....	Nordyke & Marmon Co., Indianapolis		

## TO BUILD MOTOR CAR SCHOOL

Detroit, Jan. 16—An automotive technical school to cover 15 acres and to cost \$1,500,000, will be established in Detroit by the Michigan State Auto School. The institution, with a capacity of 5,000 students will be on Grand River avenue and plans for the buildings have been completed. Separate buildings will be devoted to automobile and motor mechanics, welding and tire repairing, according to Arthur G. Zeller, president of the school. Attendance at the Woodward avenue school now is 1700 and the flood of applications from prospective students made expansion imperative.

The new school will have two dormitories, each containing 600 rooms, a gymnasium, mess hall, administration building, garage repair shop, power plant

and other buildings for motor block tests and for the tractor department. It will be the largest technical university in the world and the plans provide for enlarging the scope of the institution to include instruction in radio telegraphy, airplane and tractor construction, rubber and steel work and allied subjects.

## CUSTOMS ON MOTOR CAR REPAIRS

Toronto, Jan. 20—Should a Canadian motorist who is traveling in the United States and unavoidably meets with an accident, necessitating extensive repairs to his car, be compelled to pay customs duty on those repairs when re-crossing the border into Canada? This is a condition that does not happen every day, but since international motor touring is becoming so general in Canada and the

United States the subject calls for some investigation.

Here is what one Canadian motorist, under the existing law, had to contend with. He says:

"One night in November last when I was six miles on the other side of Albany, N. Y., and proceeding in the direction of New York, my car was suddenly crashed into by a chauffeur, who was racing with another car. Consequently I was obliged to pay a repair bill close to \$700. In addition, when returning to Canada I had to pay the tariff duty of 35 per cent and 7 per cent, which amounted to nearly \$300, for these repairs to my car in the United States.

"The Canadian Customs Department would do nothing in the matter in support of my appeal. I claim, however,

# Truck Exhibitors at the Chicago Show

NAME	COMPANY AND ADDRESS	NAME	COMPANY AND ADDRESS
Acason	Acason Motor Truck Co., Detroit, Mich.	Nash	Nash Motors Co., Kenosha, Wis.
Acme	Acme Motor Truck Co., Cadillac, Mich.	Obenchain-Boyer	Obenchain-Boyer Co., Logansport, Ind.
All-American	All-American Truck Co., Chicago, Ill.	Oldsmobile	Olds Motor Works, Lansing, Mich.
Ace	American Motor Truck Co., Newark, O.	Oneida	Oneida Mot. Trk. Co., Green Bay, Mich.
Armleder	The O. Armleder Co., Cincinnati, O.	Packard	Packard Motor Car Co., Detroit, Mich.
Atterbury	Atterbury Motor Car Co., Buffalo, N. Y.	Paige	Paige-Detroit Motor Car Co., Detroit.
Autocar	Autocar Co., Ardmore, Pa.	Parker	Parker Mot'r Truck Co., Milwaukee, Wis.
Bethlehem	Bethlehem Motors Corp., Allentown, Pa.	Patriot	Hebb Motors Co., Lincoln, Neb.
Clydesdale	Clyde Cars Co., Clyde, Ohio.	Pierce-Arrow	Pierce-Arrow Mot. Car Co., Buffalo, N. Y.
Defiance	Turnbull Motor Truck & Wagon Co., Defiance, O.	Rainier	Rainier Motor Corp., Flushing, L. I., N. Y.
Denby	Denby Motor Truck Co., Detroit, Mich.	Reo	Reo Motor Car Co., Lansing, Mich.
Dependable	Dependable Trk & Trac., Galesburg, Ill.	Republic	Republic Motor Truck Co., Alma, Mich.
Diamond T	Diamond T Motor Car Co., Chicago, Ill.	Sandow	Sandow Motor Truck Co., Chicago, Ill.
Dodge Brothers	Dodge Brothers, Detroit, Mich.	Schacht	G. A. Schacht Mot. Trk. Co., Cincinnati.
Dorris	Dorris Motor Car Co., St. Louis, Mo.	Selden	Selden Mot. Vehicle Co., Rochester, N. Y.
Federal	Federal Motor Truck Co., Detroit, Mich.	Service	Service Motor Truck Co., Wabash, Ind.
Garford	Garford Motor Truck Co., Lima, Ohio	Standard	Standard Motor Truck Co., Detroit, Mich.
Gary	Gary Motor Truck Co., Gary, Ind.	Stewart	Stewart Motor Corp., Buffalo, N. Y.
Gramm-Bernstein	Gramm-Bernstein Motor Truck, Lima, O.	Trailmobile	Trailmobile Co., Cincinnati, O.
Hendrickson	Hendrickson Motor Truck Co., Chicago.	Transport	Transport Truck Co., Mt. Pleasant, Mich.
Huffman	Huffman Bros. Motor Co., Elkhart, Ind.	Union	Union Motor Truck Co., Bay City, Mich.
Indiana	Indiana Truck Corp., Marion, Ind.	Velie	Velie Motors Corp., Moline, Ill.
International	International Harvester Corp., Chicago.	Vim	Vim Motor Truck Co., Philadelphia, Pa.
Jackson	Jackson Automobile Co., Jackson, Mich.	Walker	Walker Vehicle Co., Chicago, Ill.
Jumbo	Nelson Motor Truck Co., Saginaw, Mich.	Wilson	J. C. Wilson Co., Detroit, Mich.
Kalamazoo	Kalamazoo Mot. Corp., Kalamazoo, Mich.	Winther	Winther Motor Truck Co., Kenosha, Wis.
Kissel	Kissel Motor Car Co., Hartford, Wis.	<b>TRAILERS ON FLOOR WITH TRUCK EXHIBITS</b>	
Maccar	Maccar Truck Co., Scranton, Pa.	Fruehauf	Fruehauf Trailer Co., Detroit, Mich.
Master	Master Trucks, Inc., Chicago, Ill.	Warner Trailer	Warner Mfg. Co., Beloit, Wis.
Maxwell	Maxwell Motor Co., Detroit, Mich.	<b>BODIES ON MAIN FLOOR WITH TRUCK EXHIBITS</b>	
		Parry	Parry Mfg. Co., Indianapolis, Ind.

that the law is unjust and that it should be amended to take care of such a case as the one outlined. The question of having the repairs was not optional, but compulsory, and I claim and believe under such circumstances a car which has been damaged through no fault of the owner and to which repairs have been made, should be allowed to return to Canada free of duty."

This matter is of vital interest to Canadian motorists using their cars in the United States and the time has arrived when the law in regard to customs collection on "accidental repairs" should be fully investigated by the Government authorities.

## RUBBER ASSOCIATIONS MERGE

New York, Jan. 16—The Solid Tire and Pneumatic Tire Manufacturers' Division of the Rubber Association of America were merged into the Tire Manufacturers' Division at the annual meeting held Jan. 6. John Kearns, of the Lee Tire & Rubber Co., was elected chairman of the new division, and Seneca G. Lewis, of the Pennsylvania Rubber Co., vice-chairman.

The proposition of adopting a uniform practice of tire mileage adjustment was discussed at the meeting of the division, and considerable progress toward this end was reported. The formal adoption of a uniform scale, however, was left to be worked out at a future meeting.

Representatives on the executive board of the new division are, J. C. Weston,

Ajax; F. J. Reynolds, Empire; A. G. Partridge, Firestone; E. H. Broadwell, Fisk; William O'Neil, General; W. O. Rutherford, Goodrich; G. M. Stadelman, Goodyear; W. W. Duncan, Hood; O. R. Cook, Kelly-Springfield; R. T. Griffiths, Miller; W. B. Miller, Norwalk; J. W. Maguire, Portage; Thomas F. Walsh, Swinehart; G. F. Shugart, United States; H. H. Durr, Victor.

New officers of the Rubber Association are: Homer E. Sawyer, president; Harry T. Dunn, first vice-president; Frank A. Seiberling, second vice-president; A. L. Viles, general manager and secretary, and William C. Cox, treasurer. Five additional directors chosen are H. E. Sawyer, W. O. Rutherford, John W. Maguire, John S. Broughton and A. H. Brown.

## GALE THOMPSON FORMS CHEMICAL COMPANY

New York, Jan. 20—A. Gale Thompson, formerly sales manager of the Joseph Dixon Crucible Co., has formed an organization known as the Moto-Chemical Co. to manufacture automobile chemical supplies. Those associated with Mr. Thompson include Geo. A. Townsend, president Moto-Meter Co., Darwin R. James, president American Chicle Co., G. N. Shafer, president W. E. Pruden Hardware Co. of New York and Lester W. Perrin, vice-president Adrian Van Sinderen Co., Inc. Mr. Thompson is vice-president in charge of sales. The line of supplies to be manufactured includes shellacks, soaps, paints, polishes, and all

compounds used in the trade. A line of oils and greases will be developed later. All products are to be marked directly through the jobber trade.

## DISCUSS MOTOR ADVERTISING

New York, Jan. 18—Beneficial work along advertising lines is promised when the advertising managers of the automobile factories put into execution some of the ideas which developed at the first get-together meeting held during the New York show in the meeting room of The National Automobile Chamber of Commerce. It was the first time the advertising men of the industry have been together in a section of this kind, and some very important facts were developed.

The advertising men did things other than discuss advertising copy and the inspirational side of their work. They got down to facts and took up the question of eliminating waste and the high cost of advertising. One of the things which came up was the relation of the factory to the dealer as regards the cost of advertising in the dealer's territory. In years gone by it has been the practice of some factories to do practically all of the dealer's advertising to supply him with electrotype and advertising literature, and almost anything he wanted at no charge whatsoever, with the result that much of this material has been wasted. It seems to be the opinion among the advertising managers that this material can be given a greater value.



# Accessory Exhibitors at the Chicago Passenger Car Show

- Acme Auto Accessories Co., Chicago.  
 Advance Automobile Accessories Corp., Chicago.  
 Air Device Co., Chicago.  
 Alemite Die Casting & Mfg. Co., Chicago.  
 Aluminum Castings Co., Cleveland.  
 American Automobile Digest, Cincinnati.  
 American Bosch Magneto Corp., Springfield, Mass.  
 American Chain Co., Inc., Bridgeport, Conn.  
 American Ever Ready Wks., Long Island City, N. Y.  
 American Hammered Piston Ring Co., Baltimore.  
 Arc-o Mfg. Co., Inc., Chicago.  
 Arrow Grip Mfg. Co., Inc., Glens Falls, N. Y.  
 Au-To Compressor Co., Wilmington, O.  
 Automobile Journal Publishing Co., Pawtucket, R. I.  
 Becker Bros., Chicago.  
 Benjamin Electric Mfg. Co., Chicago.  
 Black & Decker Mfg. Co., Baltimore.  
 John W. Blackledge Mfg. Co., Chicago.  
 Briscoe Devices Co., Jackson, Mich.  
 Brown-Lipe Gear Co., Syracuse, N. Y.  
 Buda Co., Harvey, Ill.  
 Byrne, Kingston & Co., (Kokomo Electric Co.) Kokomo, Ind.  
 Buell Mfg. Co., Chicago.  
 A. S. Campbell Co., Boston.  
 Casco Mfg. Co., Thomasville, Ga.  
 Champion Ignition Co., Flint, Mich.  
 Champion Mfg. Co., Chicago.  
 L. C. Chase & Co., Boston.  
 Chicago Steel Wheel Co., Chicago.  
 Chilton Co., Philadelphia.  
 Class Journal Co., New York.  
 Columbia Axle Co., Cleveland.  
 Continental Motors Corp., Detroit.  
 Corbin Screw Corp., American Hardware Corp., Successors, New Britain, Conn.  
 Corcoran Mfg. Co., Cincinnati.  
 C. Cowles & Co., New Haven, Conn.  
 Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia.  
 Curtis Pneumatic Machinery Co., St. Louis.  
 Defender Auto Lock Co., Inc., Detroit.  
 A. J. Detlaff Co., Detroit.  
 Detroit Carrier & Mfg. Co., Detroit.  
 Detroit Pressed Steel Co., Detroit.  
 Detroit Steering Wheel Corp., Detroit.  
 Joseph Dixon Crucible Co., Jersey City, N. J.  
 Doehler Die-Casting Co., Brooklyn.  
 Dorr Miller Differential Co., New York.  
 Thomas Dunham Co., Aurora, Ill.  
 E. A. Laboratories, Inc., Brooklyn.  
 Eastern Rubber Co., Philadelphia.  
 Eclipse Machine Co., Elmira, N. Y.  
 E. Edelmann & Co., Chicago.  
 Eisemann Magneto Co., Brooklyn.  
 Electric Storage Battery Co., Philadelphia.  
 Essenkay Products Co., Chicago.  
 Everyday Engineering Magazine, New York.  
 Fairbanks Co., New York.  
 Fire-Gun Mfg. Co., Inc., New York.  
 Fleckenstein Visible Gasometer Co., Grand Rapids, Mich.  
 Ford News Publishing Co., Long Island City, N. Y.  
 Fulton Co., Knoxville, Tenn.  
 Gabriel Mfg. Co., Cleveland.  
 General Electric Co., Schenectady, N. Y.  
 Gill Mfg. Co., Chicago.  
 Globe Mfg. Co., Battle Creek, Mich.  
 Gould Storage Battery Co., New York.  
 Gray & Davis, Inc., Boston.  
 Gundy Mfg. Corp., Detroit.  
 Hale & Kilburn Co., Philadelphia.  
 L. P. Halladay Co., Streator, Ill.  
 Hart-Bell Co., Inc., New York.  
 Edward V. Hartford, Inc., New York.  
 Harvey Wheel Sales Co., New York.  
 Robert H. Hassler, Indianapolis.  
 Hayes Wheel Co., Jackson, Mich.  
 Heinze Electric Co., Lowell, Mass.  
 Hudson Motor Specialties Co., Philadelphia.  
 Imperial Brass Mfg. Co., Chicago.  
 Improved Gauge Mfg. Co., Syracuse, N. Y.  
 Inland Machine Wks., St. Louis.  
 International Magazine Co., New York.  
 Iron City Products Co., Pittsburgh.  
 Jiffy Jack Co., Cleveland.  
 Johnson Automobile Lock Co., Chicago.  
 William R. Johnston Mfg. Co., Chicago.  
 K. N. P. Products Co., New York.  
 K-W Ignition Co., Cleveland.  
 Kales Stamping Co., Detroit.  
 Atwater Kent Mfg. Wks., Philadelphia.  
 Klaxon Co., Newark, N. J.  
 Lane Brothers Co., Poughkeepsie, N. Y.  
 L. Lawrence & Co., New York.  
 LeCompte Co., Newark, N. J.  
 Lightning Change Rim Corp., Chicago.  
 Lipman Refrigerator Car & Mfg. Co., Beloit.  
 Longdin Brugger Co., Fond du Lac, Wis.  
 Luthy Storage Battery Co., New York.  
 Lyons Ignition Co., New York.  
 Motor & Accessory Manufacturers' Assn., New York.  
 McCord Mfg. Co., Detroit.  
 McKinnon Dash Co., Buffalo.  
 McQuay-Norris Mfg. Co., St. Louis.  
 Macbeth-Evans Glass Co., Pittsburgh.  
 Manley Mfg. Co., York, Pa.  
 Marlin Rockwell Corp., Motor Radiator Division, New Haven, Conn.  
 Metal Stamping Co., Long Island City, N. J.  
 Militor Corp., Springfield, Mass.  
 Morse Chain Co., Ithaca, N. Y.  
 Moto-Meter Co., Inc., Long Island City, N. J.  
 Motor Guide, New York.  
 Motor Vehicle Publishing Co., New York.  
 National Carbon Co., Cleveland.  
 National Clutch Co., Inc., Irvington-on-Hudson, N. Y.  
 Phelps Mfg. Co., Columbus.  
 Pines Mfg. Co., Chicago.  
 Powrlok Co., Cleveland.  
 Wm. E. Pratt Mfg. Co., Chicago.  
 Presto-Felt Mfg. Co., Inc., Toledo.  
 Prest-O-Lite Co., New York.  
 Primolite Sales Co., Westfield, N. Y.  
 Radcliffe Turbine-Drive Co., Inc., New York.  
 Railway & Mill Supply Co., Chicago.  
 Rajah Auto Supply Co., Bloomfield, N. J.  
 Rex Mfg. Co., Connersville, Ind.  
 Sears-Cross Co., Brooklyn.  
 A. Schraders' Son, Inc., Brooklyn.  
 Lewis Searing Co., Flint, Mich.  
 Sedgwick Sales Co., New York.  
 C. A. Shaler Co., Waupun, Wis.  
 Simms Magneto Co., East Orange, N. J.  
 Sparks-Withington Co., Jackson, Mich.  
 Stemco Engineering Co., Dayton, O.  
 Spencer Metal Products Co., Spencer, Ohio.  
 Splitdorf Electrical Co., Newark, N. J.  
 Stewart-Warner Speedometer Corp., Chicago.  
 Stromberg Motor Devices Co., Chicago.  
 Sunderman Corp., Newburgh, N. Y.  
 Tonneau Shield Co., Inc., New York.  
 Trexler Co., Philadelphia.  
 Triplex Safety Glass Corp of America, New York.  
 Tuthill Spring Co., Chicago.  
 Twin Fire Spark Plug Co., Detroit.  
 United Mfg. & Distributing Co., Chicago.  
 United States Air Compressor Co., Cleveland.  
 U. S. Light & Heat Corp., Niagara Falls, N. Y.  
 Universal Shock Eliminator, Inc., New York.  
 Utilities Sales Corp., Philadelphia.  
 Vacuum Oil Co., New York.  
 Van Sicklen Speedometer Co., Elgin.  
 Vaporizer Utilities Sales Corp., New York.  
 Veeder Mfg. Co., Hartford, Conn.  
 Waltham Watch Co., Waltham, Mass.  
 Warner-Patterson Co., Chicago.  
 Weaver Mfg. Co., Springfield, Ill.  
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Wheeler-Schebler Carbureter Co., Inc., Indianapolis.  
S. S. White Dental Mfg. Co., New York.  
Willard Storage Battery Co., Cleveland.  
J. H. Williams Co., Brooklyn.  
K. R. Wilson, Buffalo.  
Wire Wheel Corp. of America, Buffalo.  
Woodworth Mfg. Corp., Niagara Falls, N. Y.  
"X" Laboratories, New York.  
Yale & Towne Mfg. Co., Stamford, Conn.

Zenith Carburetor Co., Detroit.  
Champion Pneumatic Machinery Co., Chicago.  
Cleroline Chemical Company, New York.  
Emco Mfg. Co., Inc., Binghamton, N. Y.  
Felix Mfg. Co., Chicago.  
Fyr Fyter Co., Dayton, O.  
Ingram Motor Co., Inc., Newark, N. J.  
McAvoy Mfg. Co., Chicago.  
National Tube Co., Pittsburgh.

National Wire Wheel Works, Inc., Detroit.  
N. Y. Coil Co., New York.  
No-Leak-O Piston Ring Co., Baltimore.  
Northwestern Chemical Co., Marietta, Ohio.  
Oakes Co., Indianapolis.  
Pantasota Co., New York.  
Perfection Heater Mfg. Co., Cleveland.  
Puncturoid Mfg. Co., Chicago.  
Snead & Co., Jersey City, N. Y.  
Trade Press Pub. Co., Milwaukee.

## Accessory Exhibitors at the Chicago Truck Show

Aluminum Castings Co., Cleveland.  
American Automobile Digest, Cincinnati.  
American Bosch Magneto Corp., Springfield, O.  
American Chain Co., Inc., Bridgeport, Conn.  
American Machine Co., Newark, Del.  
American Taximeter Co., New York.  
F. A. Ames Co., Owensboro, Ky.  
Apollo Magneto Corp., Kingstown, N. Y.  
Arrow Grip Mfg. Co., Inc., Glens Falls, N. Y.  
Automobile Journal Publishing Co., Pawtucket, R. I.  
J. V. Bendus, New York.  
Buda Co., Harvey, Ill.  
Buell Mfg. Co., Chicago.  
Byrne, Kingston & Co., (Kokomo Electric Co.) Kokomo, Ind.  
Challoner Co., Oshkosh, Wis.  
Chilton Co., Philadelphia.  
Clark Equipment Co., Buchanan, Mich.  
Class Journal Co., New York.  
Continental Motors Corp., Detroit.  
Cotta Transmission Co., Rockford, Ill.  
Dayton Steel Foundry Co., Dayton.  
Joseph Dixon Crucible Co., Jersey City, N. J.  
Duplex Engine Governor Co., Inc., Brooklyn.

Eberhard Mfg. Co., Cleveland.  
Edward Valve & Mfg. Co., Chicago.  
Eisemann Magneto Co., Brooklyn.  
Empire Axle Co., Dunkirk, N. Y.  
Ericsson Mfg. Co., Buffalo.  
Essenkay Products Co., Chicago.  
Flint Motor Axle Co., Flint, Mich.  
Franklin Machine & Tool Co., Springfield, Mass.  
Gardner Governor Co., Quincy, Ill.  
Gray & Davis, Inc., Boston.  
Heil Co., Milwaukee.  
Hercules Motor Mfg. Co., Canton, O.  
Here Mfg. Co., Philadelphia.  
Hi-Volt Mfg. Co., Milwaukee.  
Horizontal Hydraulic Hoist Co., Milwaukee.  
Hudson Motor Specialties Co., Philadelphia.  
Iron City Products Co., Pittsburgh.  
Jaxon Steel Products Co., Jackson, Mich.  
Laurine Magneto Co., New York.  
Martin Cushion Wheel Co., Chicago.  
Mead-Morrison Mfg. Co., East Boston, Mass.  
Merchant & Evans Co., Philadelphia.  
Minneapolis Steel & Machinery Co., Minneapolis.  
Morand Cushion Wheel Co., Chicago.  
Pantasote Co., New York.  
Parker Axle & Products Corp., New York.

Petroleum Motors Co., Chicago.  
Pittsburgh Model Engine Co., Pittsburgh.  
Power Farming Bureau, St. Joseph, Mich.  
Russel Motor Axle Co., Detroit.  
A. Schrader's Son, Inc., Brooklyn.  
Sewell Cushion Wheel Co., Detroit.  
Splitdorf Electrical Co., Newark, N. J.  
Standard Steel Castings Co., Cleveland.  
Stromberg Motor Devices Co., Chicago.  
John Thomson Press Co., New York.  
Torbensen Axle Co., Cleveland.  
Trindl Co., Chicago.  
Vacuum Muffler Corp., New York.  
Vaporizer Utilities Sales Corp., New York.  
Waukesha Meter Co., Waukesha, Wis.  
Wollman-Scaver-Morgan Co., Cleveland.  
West Steel Castings Co., Cleveland.  
Wheeler-Schebler Carbureter Co., Inc., Indianapolis.  
Wisconsin Motor Mfg. Co., Milwaukee.  
Auto Truck Service Co., Milwaukee.  
Auto Insurance Co. of Hartford, Conn.  
Alfon E. Bahr & Co., Chicago.  
Continental Axle Co., Edgerton, Wis.  
Dewey Rubber Co., Chicago.  
Iron Mountain Co., Chicago.  
Robertson Cradlelock Wheel Co., Chicago.

### ST. LOUIS PLANS FOR SHOWS

St. Louis, January 16—Two motor car shows at the same time for one admission. This is the program of the St. Louis Automobile Manufacturers' and Dealers' association for the week of Feb. 16 to 21, as decided upon by the show committee of the association at a meeting last week.

A passenger car and accessory show at the old Southern Hotel Building at Broadway and Walnut street. The Coliseum at Jefferson and Washington avenues, will be the scene of the truck show, which will comprise every type of commercial car.

Admission tickets will be sold for 50 cents at either show. The tickets will carry a coupon admitting the bearer to the other show at any time. The dis-

tance between the two shows is several miles. Purple and yellow,—the colors of the St. Louis show,—will be used exclusively in the decorations, eliminating flags and national colors. Invitations to the show will be sent to dealers in the St. Louis trade territory who sell through distributors here.

Capt. Robert E. Lee will be general manager of both shows, and George Shattgen will be assistant manager in charge of the truck show.

### WORCESTER SHOW THIS WEEK

Worcester, Mass., Jan. 16—The largest automobile show ever held in Worcester will be staged in the state armory the week of Jan. 19. The choice of the 1920 models shown in New York will be shipped overland to Worcester, where

they will be placed on exhibition for the second time in the United States.

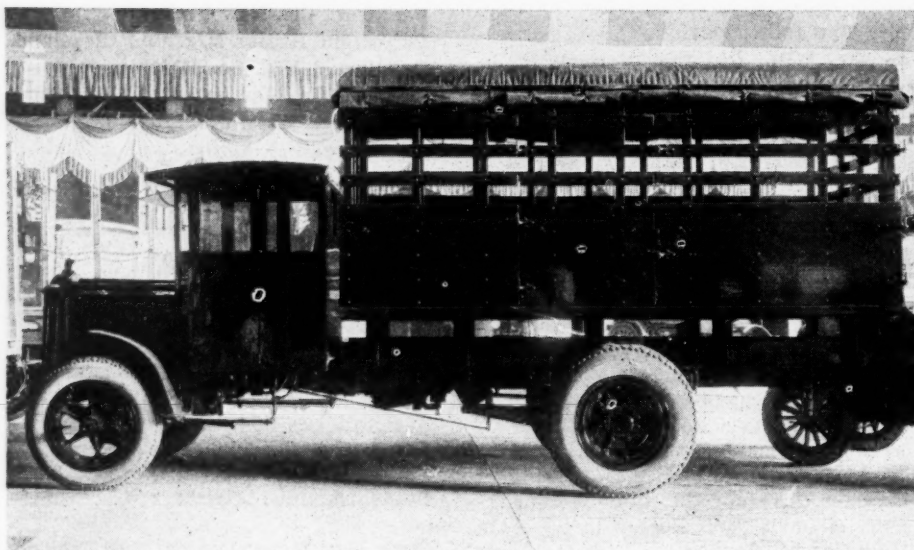
It is estimated that more than forty different makes will be exhibited and there will be numerous booths displaying accessories. The variety and quality of models will surpass anything ever attempted by the Worcester Auto Dealers' association and will be second in New England to the Boston show only.

Nearly every dealer in Worcester has entered to show his products, and the factories have promised the dealers that only the latest and most advanced models will be shipped to Worcester.

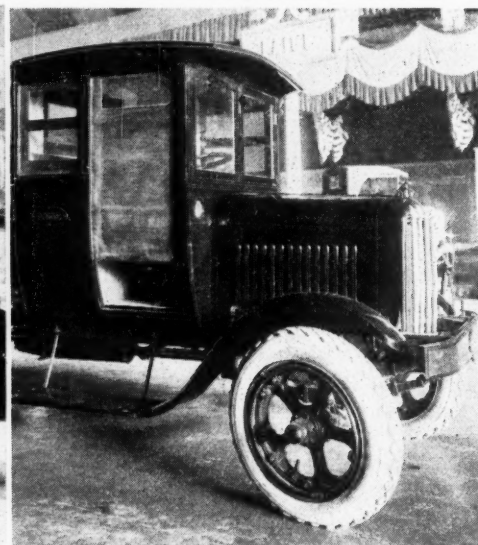
Worcester is fortunate in securing the models from the New York show as they will be exhibited here before patrons in Boston, Chicago and Kansas City have a chance to see them.



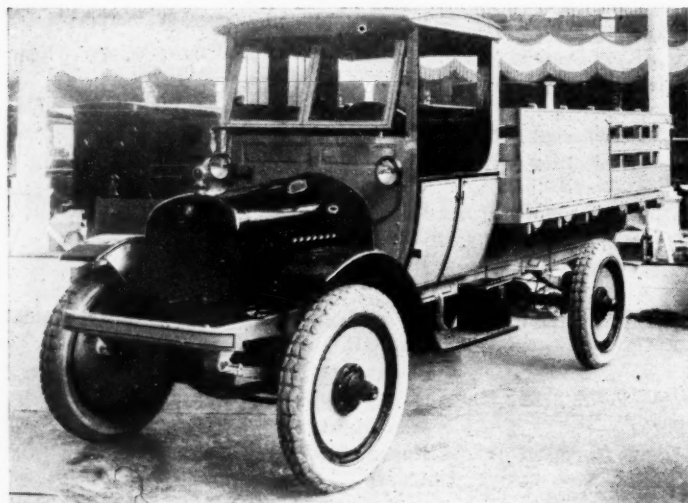
# Some of the Motor Trucks Exhibited at the New York Show



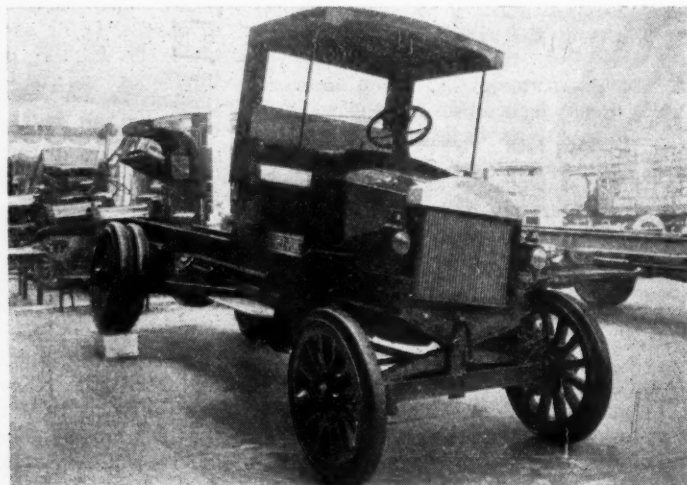
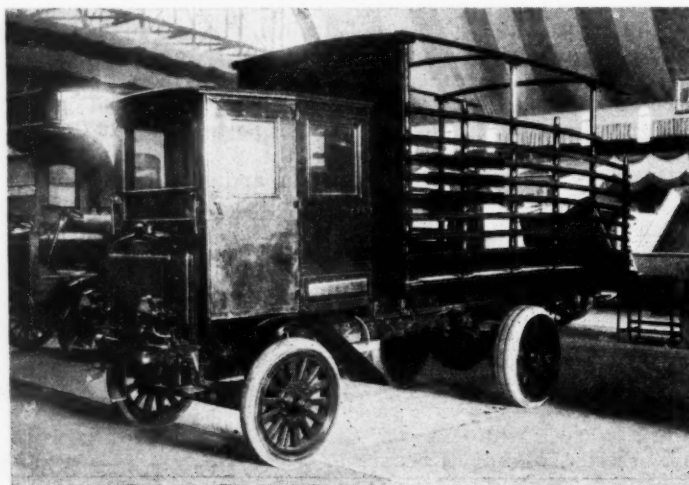
The new Packard three-ton truck with pneumatic tires



Comfort for the driver. The new Paige



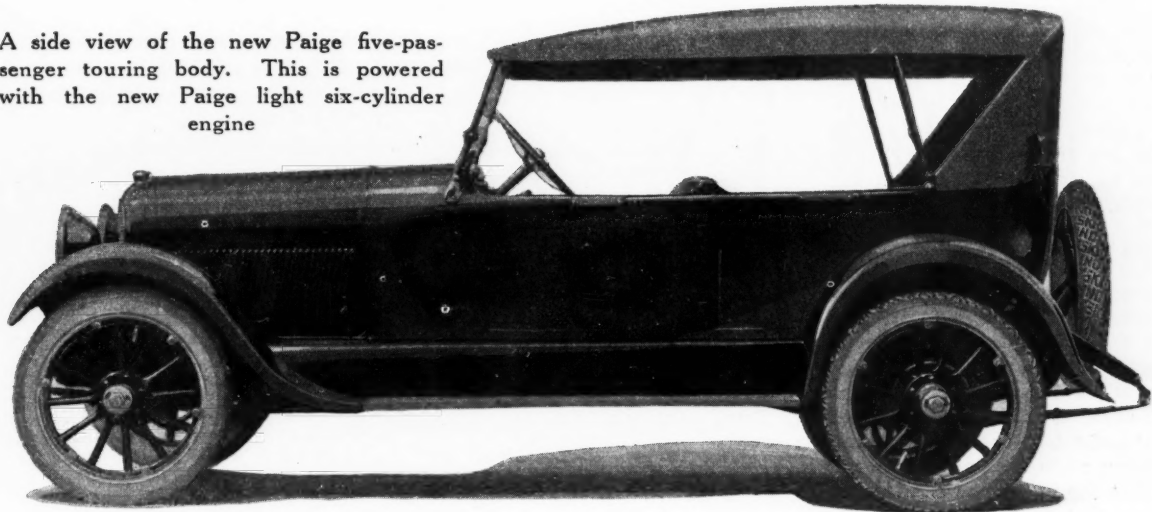
ed by this company; right, the new LaFrance truck. The steer-Left, the new 1½-ton Graham, one of a line of trucks manufacturing gear connection is placed in front of the axle instead of in back of it



Left, the new four-cylinder Autocar, the first model using an engine of this number of cylinders made by the company; right, the Three-Point truck, an interesting exhibit at the Armory

# New Paige Uses Own Engine for First Time

A side view of the new Paige five-passenger touring body. This is powered with the new Paige light six-cylinder engine



THE new Paige car, exhibited for the first time at the New York show, and which is the first Paige car to be equipped with an engine made completely in the Paige factory, is a light weight six-cylinder job having a wheelbase of 119 in. The larger model, the 6-55 is to be continued with refinements and improvements. The small six though because of its newness is to be the subject of our story.

The chassis frame and drive members are of different construction altogether than the present Paige, and being of shorter wheelbase, the propeller shaft is a single unit instead of the divided yoke shaft used in the longer six. The engine and transmission gearset are manufactured in the Paige plant, and the majority of other parts secured from well-known parts makers, the clutch being a Borg & Beck, the propeller shaft is universal, Detroit, front and rear axles, Salisbury, the wheels Kelsey, steering gear, Jacox, radiator, National Can, and the electrical equipment, Gray

## PAIGE SPECIFICATIONS

WHEELBASE .....	119 in.
ENGINE, six-cylinder.....	bore and stroke, 3½ by 5 in.
LUBRICATION .....	Force-Splash
CAMSHAFT DRIVE .....	Fibre gear
DRIVE .....	Hotchkiss
SPRINGS .....	Semi-elliptic
STARTING AND LIGHTING.....	Gray & Davis
IGNITION .....	Atwater-Kent

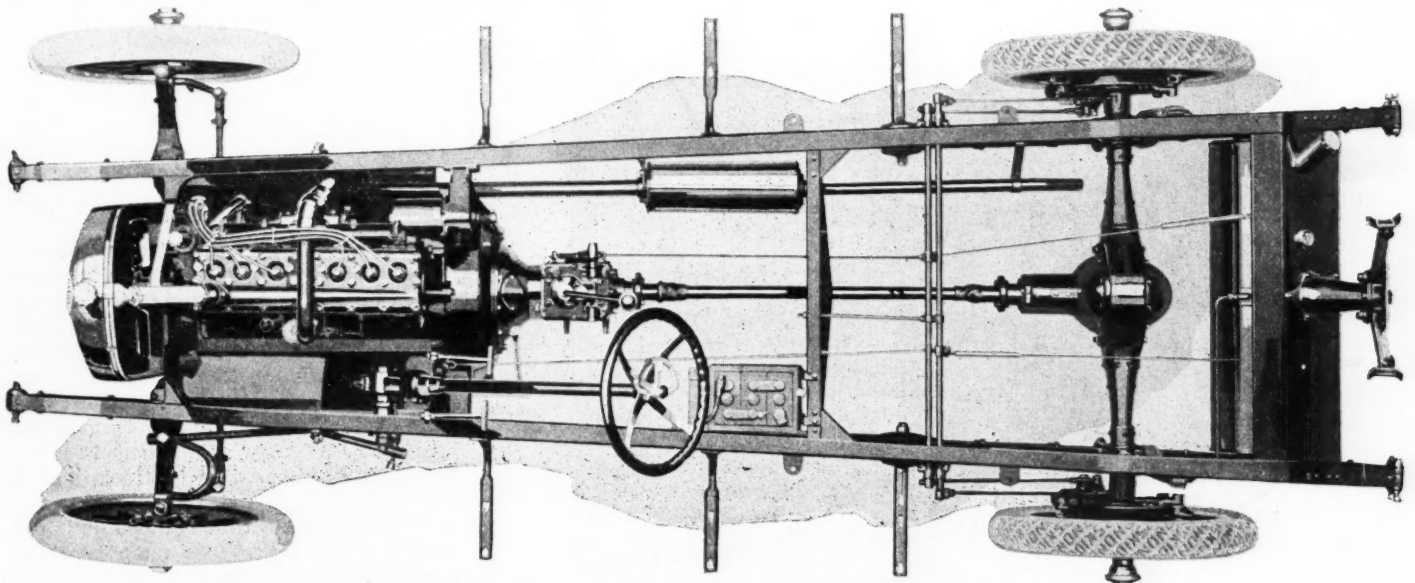
& Davis for starting and lighting, with Atwater-Kent ignition.

Of particular interest in the new Paige car is the 3½ by 5 in. six-cylinder engine of 231 cu. in. piston displacement, and a speed range of 200 to 2,800 r.p.m. This incorporates every-

thing in the way of up-to-date ideas in L-head construction. The compression ratio is about 5 to 1, or 20.37 per cent of the total volume, and the weight of the engine less the fan, carburetor and the electrical equipment is 644 lb. Including the above equipment, it weighs 702 lb., and including the unit clutch and gearset, 816 lb.

Following what seems to be becoming universal practice, the cast-iron cylinder block is in the unit of the upper half of the crankcase. The head is separate and the bottom pan contains the oiling system. The part of the crankcase which is integral with the cylinders is carried 1 13/16 in. below the center of the crankshaft for stiffness, and has a milled slot to take the main bearing caps. The engine is a three-bearing type.

To evenly distribute the load over the cylinder head, it is secured by 22 studs of 7-16 in. diameter and so designed as to allow for free water circulation around the valves and cylinders. Particular care has been taken in laying out



Top view of the Paige chassis. A noticeable feature of Paige design is the clean cut appearance of the chassis



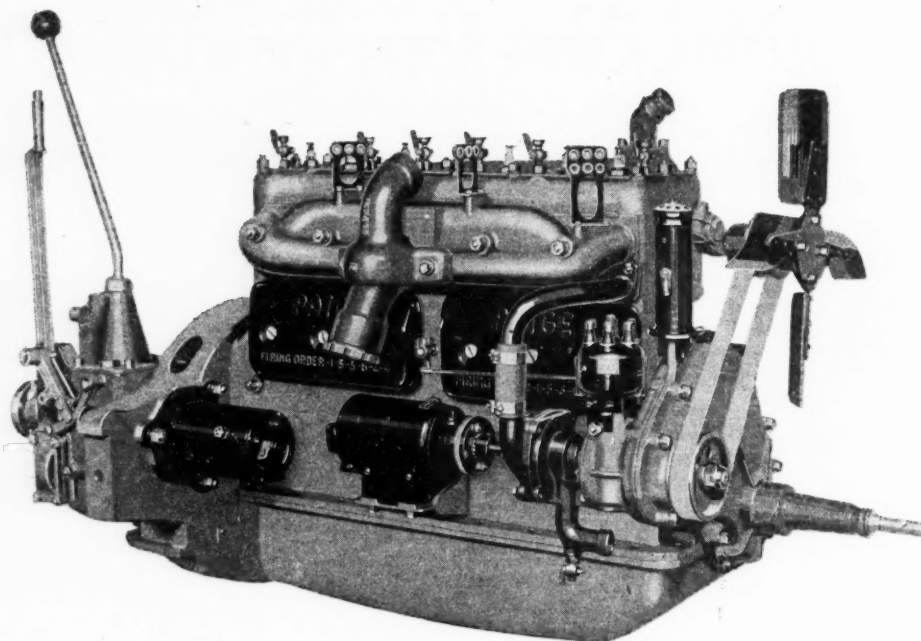
the water channels to eliminate the possibility of steam pockets. One particular point which will be appreciated by the garage and service departments is that lugs are cast opposite cylinders No. 1 and 6 so that a screw driver or cold chisel may be used for prying the head loose without causing injury to the cylinder head gasket. The frequency with which heads are frozen to the cylinder makes this a particularly valuable point in repair work.

#### Carburetor on Left Side

In designing the cylinder, the carburetor is secured to the left side and the mixture carried across by means of a  $1\frac{1}{4}$  in. diameter cylindrical cored passage between cylinders No. 3 and 4 to the combination exhaust and intake manifold located on the right side. The fore and aft intake passage is located above the exhaust so that the bottom of the intake, where the heaviest fuel tends to lie, is exposed to the greatest heat. This acts as a means for quickly warming the engine when starting cold, and for proper carburetion of present low grades of fuel. The intake passage is cylindrical for its entire length.

Practically a double manifold is used for the exhaust with a common exit at the center of the engine, each half of the manifold taking care of three cylinders. A modified ejector action is secured at this manifold on account of the firing order, which is 1, 5, 3, 6, 2, 4, explosions occurring at opposite ends of the manifold, providing this action.

The crowned grey iron pistons are fitted with three rings, two of which are above the piston pin and one below. The piston pin is hollow, 1 in. outside diameter, hardened and ground and fastened on one boss of the piston with a cyanided set screw. The weight of one bare piston is 22 oz., and the weight of the piston



Right side view of the Paige engine. This is the first year in which the Paige company has built its own engine

including the pin, set-screw and rings is  $28\frac{3}{4}$  oz. The bottom edge of the bottom piston ring groove is beveled and ventilated with eight  $\frac{1}{8}$  in. holes to avoid oil pumping, and in addition there are seven  $\frac{1}{8}$  in. holes drilled in the bottom of the ring groove. The lower edges of all of the piston rings are fitted with a recess which scrapes the excess oil from cylinder walls, and at the end of the down stroke expels this excess oil from the cylinder bore. The rings are of Wasson manufacture and are of the opened concentric type. In manufacture, a special Toledo scale is used to accurately weigh the pressure necessary to close the ring to the proper diameter, and this is held from 8 to 10 lb. A running clear-

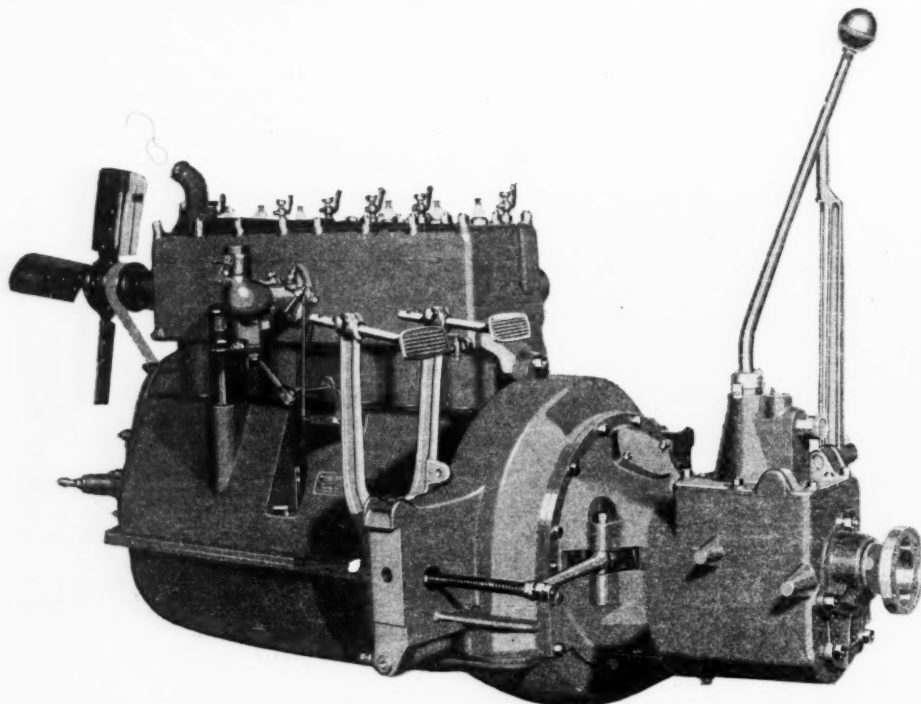
ance of .002 to .003 in. is provided at the bottom of the pistons, and .013 in. to .015 in. at the top.

The connecting rods are drop forged from carbon steel and are  $10\frac{1}{2}$  in. center to center. The upper end is bushed with bronze, the lower end with die-cast babbitt. Adjustments on the lower end of the rod are taken care of by laminated shims, graded .002 in. thick. Two heat treated connecting rod bolts of 7-16 in. diameter are used for each cap. These bolts are of nickel steel and secured with castle nuts and cotter pins. The piston end of the connecting rod is drilled to intercept an annular groove turned on the outside of piston pin bushing. Four holes equally spaced are drilled into this annular groove and meet four oil grooves on the inner surface of the piston pin bushing, which distribute oil over this bearing. The weight of the connecting rod assembly is 2 lb. 15 oz., and the rods in any engine are held within  $\frac{1}{4}$  oz. of the same weight.

#### Heavy Crankshaft

The three-bearing crankshaft is drop forged from carbon steel and is heat treated. The weight of the finished shaft is 69 lb. It has a diameter of  $2\frac{1}{2}$  in. on the crankpin and on the three main bearings respectively, front to rear, 2.115, 2.125 and 2.135, giving a shaft of exceptional stiffness. End play is taken care of at the front main bearing by a  $3\frac{1}{4}$  in. flange on the front surface of the first web, and the rear surface of the hardened gear which drives the camgear. Each of these surfaces are polished and bear against flanges on the front main bearing. End play adjustment is made by means of shims, .004 in. thick, placed between the gear and a shoulder on the crankshaft. A clearance of .005 in. is desired for end play. The main bearings are S. A. E. No. 24 babbitt.

The 1 in. camshaft is driven by a



A left side view of the new Paige engine

Fabroil gear mounted on a 4 in. flange at the front end. The  $\frac{3}{4}$  in. cams are integral, the intake having a lift of .3125 in. and the exhaust .317. The cams are offset from the center of the mushroom valve lifters causing the latter to rotate, thus distributing the wear. The shaft is carried on three bearings and at the center of the center cam bearing is an eccentric having a stroke of 5-16 in., which is used for operating the plunger oil pump. All of the camshaft bushings are die cast from S. A. E. No. 24 babbitt. The front cam bearing is prevented from rotating by means of a 3-16 in. brass dowel, which is pressed into the cylinder and engages a slot in the flange of the bushing. At the front end, the camshaft is bored out to receive a coiled spring and a hardened and polished thrust button, which bears against a hardened and polished shoulder pin in the timing gear cover to fix the location of the camshaft.

### Two Types of Valves

Two types of valves are being employed, the difference between them being that one type has cast-iron heads and the other nickel steel heads. The valve stems in each case are of carbon steel, the bottom ends being machined to a radius and hardened and polished. The diameter of the valve port is 1 7-16 in., and the greatest diameter of the valve head is 1 9-16 in. The angle of the valve seat is 45 deg., and the weight of the valve is 4½ oz. The valve stems operate in 4½ in. cast-iron guides pressed into the cylinders. The springs are  $\frac{7}{8}$  in. inside diameter and 2¼ in. long. When closed they exert a pressure of 45 to 50 lb., which increases to 68 lb. when the valve is wide open. The clearance provided between the head of the adjusting screw and the valve stem is .003 in.

A feature of interest to repairmen and service stations is the fact that by removing the three screws which retain the valve spring covers, the valve lifter brackets are easily removed. There are two of these brackets which are secured to the cylinder by means of four cap screws and two headed dowels each. The

intake valve lifts .309 in. and the exhaust valve .314 in., the valve timing being as follows:

Intake opens 15 deg. past top dead center.

Intake closes 50 deg. past bottom dead center.

Exhaust opens 45 deg. before bottom dead center.

Exhaust closes 10 deg. past top dead center.

Lubrication is by combined force feed and splash, giving a consumption which varies between 400 and 700 miles per gallon of oil. The oil is forced under pressure to each main bearing by means of a plunger operated by the eccentric described. The pump is bolted to the bottom face of the cylinder by three screws and is operated by a plunger of steel tubing. A  $\frac{3}{8}$  in. tube carries the oil from the pump to a 5-16 in. diameter tube on the left side of the engine. Branches of these tubes extend to each main bearing cap. At cylinders No. 2 and 5 a hole .042 in. is drilled into the tube which delivers oil to the troughs under the connecting rods at these cylinders. The oil which enters the main bearing is distributed over the bearing surface with grooves 3-16 in. wide and 3-64 in. deep. The oil enters each bearing through a  $\frac{1}{8}$  in. hole and at the end of the groove is located a 3-32 in. diameter hole to provide an outlet for the oil. The object of this construction is to carry the heat away from the bearing, and also to remove any foreign substance which may have been washed into the bearing through the pump. After passing through the front main bearing, the oil enters the timing gear cover maintaining a sufficient level to insure the crank-gear dipping. The level is maintained by means of a dam, over which the oil flows into No. 1 trough. The excess oil from the center main bearing drains into No. 3 and 4 troughs and from the rear main bearing into No. 6 trough. This connecting rods have a normal dip of  $\frac{1}{8}$  in.

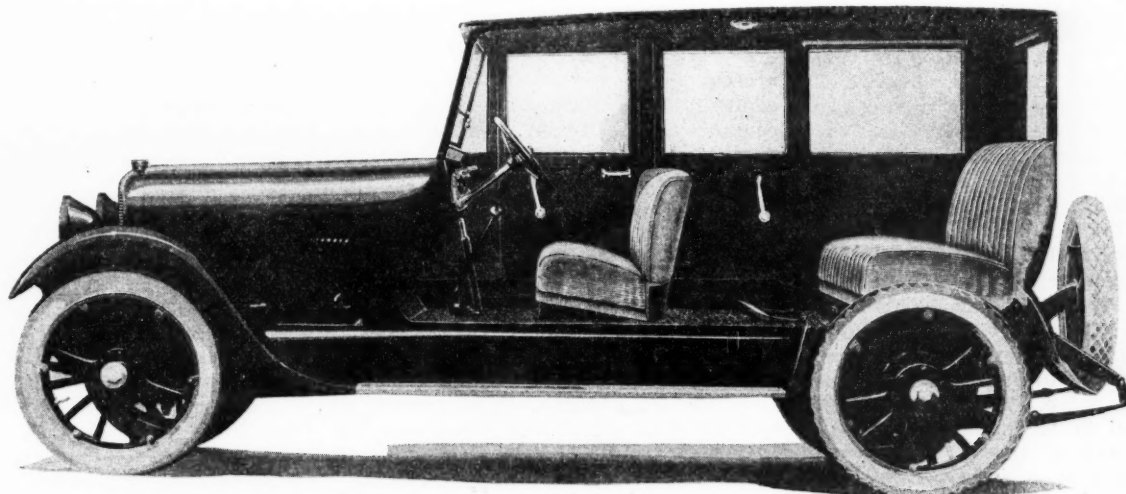
On the right side of the engine, troughs connect dipper troughs Nos. 1 and 3 and another trough connects Nos. 4 and 6 for distribution purposes. The oil level

is indicated by a float level gage and the pressure is prevented from becoming too great by an oil pressure regulator that is built in as part of the oil pump body, consisting of a  $\frac{3}{8}$  in. diameter steel ball held against its seat by a  $\frac{3}{8}$  in. spring with a load of 1 lb. When the pressure on the oil line exceeds 3 lb., the ball is forced from its seat allowing the excess oil to empty into the lower oil pan. An oil pressure gage registering up to 8 lb. is mounted on the dash.

The Gray & Davis starting motor is located on the forward right side of the flywheel housing 2 in. above the center of the crankshaft. The generator rotates at 1½ crankshaft speed and starts charging at 7 miles per hour, or at 500 r.p.m. of the armature shaft. At 14 miles per hour, the generator should charge from 12 to 14 amp., and can hold this rate for a speed of about 35 miles per hour. The storage battery is 111 amp. hr. Willard type, six volts, and the ignition is the Atwater Kent automatic advance type, the distributor being located on the right side of the engine near the front end and driven by a five-tooth, twenty pitch, spiral gear on the water pump shaft. The ignition drive is an integral part of the engine design and is automatically lubricated by the timing gears. The spark plugs are of the A-C type,  $\frac{7}{8}$  in. thread.

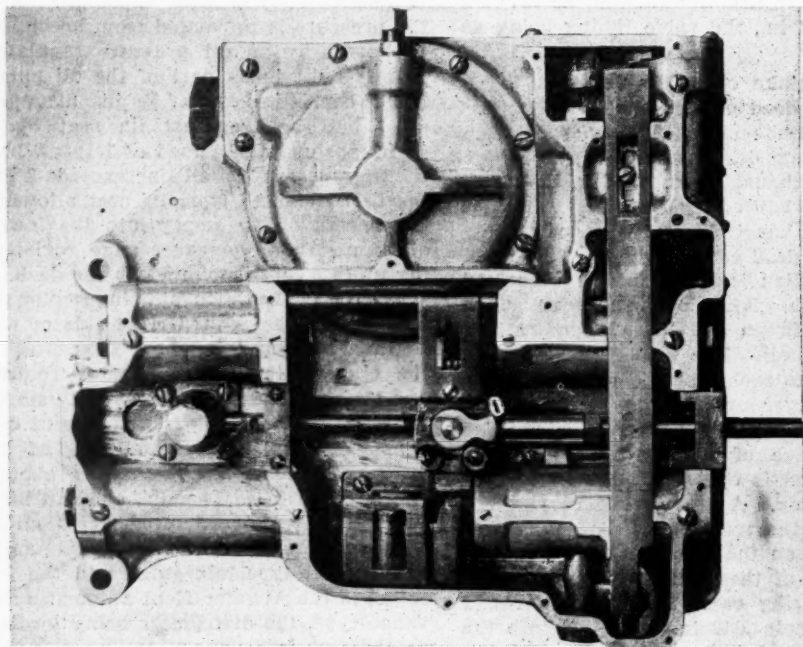
### Borg & Beck Clutch

The flywheel housing is a 48 lb. iron casting secured to the rear end of the cylinder by five bolts  $\frac{1}{2}$  in. in diameter. This housing also serves as a bracket for the brake and clutch pedal mountings and the clutch, which is a 10 in. Borg & Beck dry plate, type DX. The gear-set is bolted directly to the flywheel housing with ten  $\frac{3}{8}$  in. cap screws, forming the unit power plant. It is a selective type having three forward speeds and one reverse, the third speed being direct drive through a four jaw clutch. The gear reductions in the box are 2.925 to 1, 1.6363 to 1 and reverse 3.9 to 1. All the gears are 6-8 pitch, stub tooth, and  $\frac{7}{8}$  in. face excepting the countershaft drive gear, which is  $\frac{3}{4}$  in. face, and the main drive gear, which is

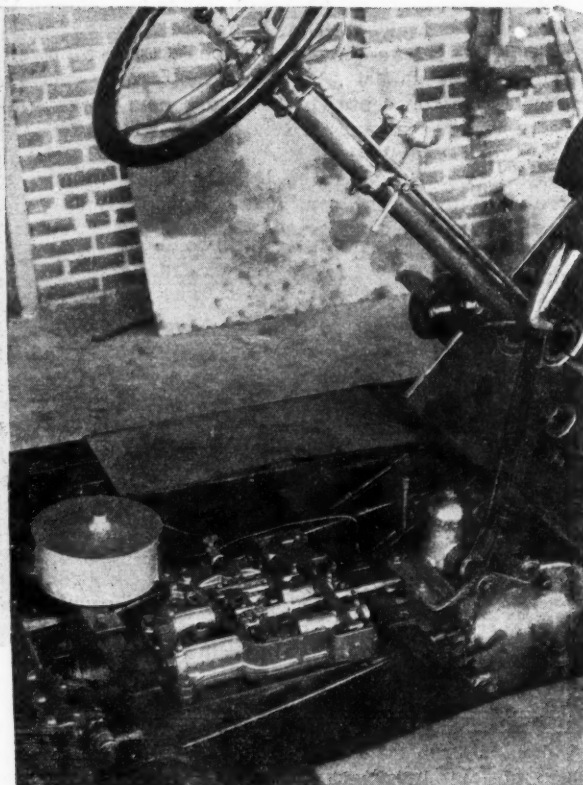


A phantom view of the new Paige, showing roomy interior and luxurious upholstery





The Laursen hydraulic gear shifting mechanism; right, how the mechanism is installed



## Laursen Hydraulic Gear Shift Eliminates Conventional Lever

### Installation Can Be Made by a Mechanic on Any Car Having a Three-Speed Gearset

IN order to do away with the conventional manner of gear shifting the Laursen Hydraulic Gear Shift has been brought out. It is a unit weighing 25 lbs., made of cast iron, excepting the working parts, which are steel. It is bolted upon two angle irons, which in turn are bolted to frame of the car. The installation can be made by any mechanic on any car having a three-speed gearset.

#### Operation Is Simple

The power lever of the device is hooked to the end of the gearshift pinion at the same point where the gearshift lever is attached. The clutch pedal is connected to the unit through a shaft which operates directly the master valve. The operation is simple. The driver sets the lever on the steering column at the speed desired. This turns the master valve into such a position that the pressure on the oil medium applied through the clutch instantly is released at the moment of disengagement. The power is generated by the pressure of the foot upon the clutch and is communicated to a series of pistons through a power cylinder operated through the action of the master valve. This master valve allows the oil in the power cylinder to be directed against the pistons in the certain selection of cylinders which operates the respective shifts.

Thus, if the shift to first speed is desired, the master valve accordingly is set at a position which will allow the pressure put upon the clutch pedal to be communicated to cylinders 1 and 3 which operate the main lever and make the shift. It is said the Laursen shift can apply a pressure of 250 lbs. if necessary to make the shifts. For each 40 lbs. pressure required to operate the

shift but 1 lb. additional is required on the clutch pedal.

As it operates in oil, the device requires no lubrication. A reserve oil tank is placed on the unit to make it fool-proof, it is stated. Protection from accidentally shifting into reverse is afforded by a press button on the steering wheel quadrant, similar to the safety device on the present hand lever.

#### Paige Uses Own Engine in New Model

1 1-16 in. face. A neutral clearance of 3-16 in. is provided and the gear teeth are chamfered to assist in shifting. The center to center distance of the main and countershaft is 3½ in. The main drive gear is carried on annular ball bearings at the rear end, and on a Hyatt roller at the forward end. The main shaft is carried on an annular ball bearing at its rear end and a Hyatt bearing at the front end, and the countershaft on the Hyatt bearing at each end.

The main drive gear and the spline shaft bearings are carried directly in the case and are clamped against a shoulder by their outer races. The gearset is provided with a lock which prevents the engagement of the hand lever with either of the gear shifters, thus locking the gearset in neutral. When the tube is

moved to the locking position a Yale cylinder automatically locks it in place, and the key is necessary only for unlocking. The Yale lock has 250 different combinations or key changes.

Hotchkiss drive is employed. Both sets of brakes are on the rear wheels. The frame is pressed steel type with gusseted cross-members and a 17 gal. gasoline tank mounted across the rear. It is of straight taper construction. The springs are semi-elliptic all around, the rear springs being 61¼ in. in length. The bodies are straight line, moulded type, with a modified center cowl. It carries a four-bow top, sloping windshield and a cowl which is in straight line with the top of the hood. (Note—A slight additional amount will be added on the body types and prices).

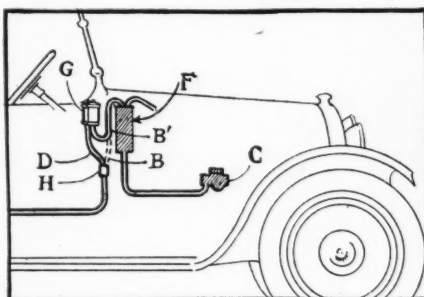
# Gas-Co-Lator Attacks the Fuel Problem

Visible Filter Designed to Remove All Foreign Matter from Gasoline Before It Reaches Carburetor

MUCH of the trouble caused the motorist from his carburetor is due to dirty gasoline, having sediment and water in it. A good deal of the sediment is picked up from the dust of the road, deposited on the filler cap which is spilled into the tank when refilling. To overcome this trouble and annoyance, the Visible Gasoline Filter Co. has developed a filter that filters the gasoline only as it is used and fed to the carburetor and that functions in plain view of the driver as it is secured to the dash.

The instrument is attractive in appearance, being in harmony with the rest of the instruments on the dash board. It comprises of two glass walled cylinders, capped on either end with a nickelplated cap and held in between shellacked cork gaskets. The gasoline is fed into the first of the two cylinders, where it strains through the chamois sack in an upward direction. After passing the chamois the liquid passes through a horizontal passage in the top of the top cap, to the second cylinder, where the purity of gasoline can be observed, and its specific gravity tested by the small hydrometer inclosed in this second cylinder.

Experimental work has been done with the filter for a number of months and surprising results were obtained. Even with the best grade of gasoline obtainable at filling stations, it was found that there was a tremendous amount of water, dirt and sediment present and a few weeks running in an expensive car



Left, how the gasoline passes through the filter on its way to carburetor; right, the filter installed on the instrument board

showed that a great deal of the present day engine trouble can easily be traced to the poor quality of fuel now sold. In fact, the amount of dirt extracted from the fuel was enough to make one wonder how a car could run on it at all.

The instrument is extremely simple in its operation and its construction enables one to see just what action is performed. The dirty gasoline entering in the left hand cylinder is strained through a chamois filter having 12 sq. in. of surface, giving it ample surface for quick filtration even at the highest speed, and then passes to the right hand cylinder from which it passes to the carburetor.

The particular value of this instrument lies in the fact that the filtration of the fuel is accomplished very slowly through

a large area of chamois. Thus there is no forcing of the liquid and the dirt particles are thoroughly removed. The installation of this instrument, called the Gas-Co-Lator, is simple being installed in the gasoline line just before the vacuum tank. It is being made by the Visible Gasoline Filter Co., 723 South Wabash avenue.

## The Service Floor of the Ideal Service Station

(Continued from page 11)

only for the inspection and repair. No backing or turning around has been necessary, nor has the parts department in front been called upon.

**Case 3**—Let us assume the rear axle in this case has an exterior adjustment. After driving in the car the owner tells the service manager his rear axle gears howl and he must have fresh oil in the crankcase. The car is run ahead on into the space between wash rack and electrical department, or if this is filled head on into the bench side of the room. The man in charge of the floor service, i.e. filling radiators, lubricating parts, etc., removes the old oil and refills with fresh, while at the same time a mechanic has removed the tonneau floor boards and set the slotted ring a notch or two ahead and by the time he gets the adjustment locked, boards put back, carpet in place, etc., the other man has finished his job and the car is ready, being backed into the runway and run out in the same manner as the others.

It thus will be seen that no matter for what a car comes in, it can be handled in such a way that there will be no confusion and if care is taken that the electrical department has on hand such parts as are called for most, no time will be lost in going back and forth from the regular parts department.



The Gas-Co-Lator. The dark rim in the left hand cylinder is dirt which has been filtered from the gasoline



# Co-Operation, Personnel, Good Work

## These Are the Three Factors Essential in the Sale of Service

THE three essentials in the sale of service are:

### CO-OPERATION PERSONNEL GOOD WORK

The importance of co-operation in any organization has been overlooked by the majority of service men. I think you will all bear me out in this, in not getting together and working shoulder to shoulder. The necessity of working in conjunction with the sales department is just as important as working in harmony with your own organization, and should be impressed very strongly on every one. The sales department makes the first sale and then the service department is the goat. They have sold the man and we have to deliver what the salesman promises. How often that happens. They tell the owner the car is guaranteed for ninety days and the service station will take care of everything but accidents. The car was guaranteed for thirty days, Mr. Customer comes back when his car is about two months old and the service man has one good job on his hands to satisfy him so that he feels he is getting a square deal.

#### Service Station Is Big Re-seller

The average service station re-sells at least 75 per cent of the automobiles on the road today, and we are not working to our full capacity because we lack co-operation. Sometimes it is hard to find out what the salesmen say, but by working with them, co-operating, and getting them to see our side of it as well as to look at theirs—the two organizations, because there should be two—will work more harmoniously.

The personnel of an organization is a hard matter today. In selecting a man for a certain position, make it a practice of picking from your own force, train him, give him encouragement in the way of advancement, and in that way a great deal of difficulty will be overcome as he will know you are working for his interest. The tendency in the automobile business has been to play favorites, picking out friends and giving them good positions and "to HELL with the poor devil who really does the work." How many of you have been side-tracked because the man you were working for had a good friend of his that he wanted to put in? That does more harm in any organization than anything I know of.

I was requested by the sales department to try out a man. As I needed a good foreman and believe in co-operation, tried him out. He came in for work

BY AL RAWSON

(President, Automobile Service Association,  
Newark, N. J.)

*Mr. Rawson, in his article on this page, makes several good points which will be well worth study by dealers' service managers. The paper published this week by Motor Age was one which was read before the guests of the New York and Newark Service Managers' associations at their meeting held in conjunction with the New York Automobile Show and was met with much applause.*

Monday morning and after being there a short time I noticed an unusual amount of dissension among the men. Tuesday morning I asked where he was and the last seen of him was going out the door. It was very important that I take care of some outside business that day so I picked the best man I had in the shop, called him into my office and told him to take charge and run the place. I have had better results and better work than at any time before. Those fellows realize at last I woke up and was trying to boost them along.

#### Dealers Will Teach Men

The time is coming soon, at least I hope it will, when the dealer will wake up to the fact that they have men working for them who are competent to handle bigger jobs and give them an opportunity. Look around your organization if you want a man for shop foreman—you will find one, and also find he has some good ideas. Good workmen is the keynote, and can only be accomplished through co-operation. A good man is cheap. No doubt we have felt that if we could get along without paying a man so much money we would make a larger profit, but when it is simmered down, cheap labor is a liability and good labor an asset.

We have all been put in our respective positions "to improve and facilitate co-operation" for the company we represent "and owners of its product through efficient service."

#### Service Men Are Salesmen

Many service managers are under the impression that they are not salesmen. We all sell. I used to think I could not sell postage stamps until six months ago. A very good opportunity was presented to me to get out of the automo-

bile business and go into something that would no doubt be a great deal more lucrative to me. The man that made this proposition wanted some one with sales ability, so I said "why pick on me, I'm not a salesman." He answered "yes you are, you are selling one of the hardest things I know of and that is service."

Have you fellows ever looked at it in that way? I woke up. Then I became convinced that I was not only selling service, but selling myself to everybody that I came in contact with, and firmly believe that that is what we do every minute of the day. We sell from the day we are born until our body is turned over to the undertaker. All our friends have been buying our personality—not for a monetary consideration (they wouldn't be our friends if they did)—and our enemies buy—well, it is hard to tell what. The better we sell ourselves to our employers, the more we get in the pay envelope. They say a man is judged by the company he keeps, which is very true, but he is judged more by the way he sells himself than by the company, because salesmanship can be built up and improved upon and a man can come back strong if he uses the right kind of tact.

#### Cleanliness Is Big Factor

The first thing that impresses the customer when entering a service station is its appearance. A clean shop is just as important as good work, because every man realizes that things have to be clean or he will not be particular and turn out the best grade of work. You know if you have a dirty place that men lose spirit, for cleanliness is next to godliness.

The next impression will come from the man who takes the order, a service salesman, most of us have elevated our men to that. He should be one of the most important members of the organization. He is the fellow the customer sees first. The majority of service managers think that an ordinary clerk who can take an order is all they need. I differ with them.

The service salesman need not necessarily be a first class mechanic, or expert in the stock room, but fairly well informed so that he can talk intelligently; have a good idea of the parts required; length of time needed to do the work and thereby enable the customer to get an approximate idea of the completed job. This would work out different on the flat rate system.

A neat, clean-cut, gentlemanly service salesman will give the customer the idea that the organization is com-

posed of the right kind of men; not the kind with a dirty collar and who needs a shave. You do not want that type of man. The customer leaves his order feeling that he is going to get a square deal, and with good will towards the company. Service salesmen come in contact with all classes—the wealthy as well as the hard worker,—therefore it is necessary for him to be educated so he can put himself on the same plane with them. You have to get down on a level with some of them and use rough methods, some like it, then again one comes in worth thousands and your salesman should be competent to talk to him in the way he likes to be talked to.

### Courtesy Always Good Policy

A salesman should always be courteous, polite and neat in appearance. My men today can give the prices on about 75 per cent of our work and hardly bother me at all.

The sale having been made the car goes into the shop. Try to keep the customer and shop as far apart as possible, only in special cases should the customer come in contact with the shop foreman. We all know the necessity of proper handling of work tickets, checking time and material to eliminate errors and also of good workmanship. A clean shop goes with good work.

During my travels to these Tuesday meetings around New York I noticed a sign:

"CLEAN WORK—CLEAN SHOP—CLEAN TALK."

Those six words mean a great deal and will do as much as anything else to put us on the right footing.

When the customer comes back for his car the service salesman should be able to call him by name. It makes him feel good. You all know if you go into a store and have a clerk wait on you who says, "Good morning, Mr. So and So, and you have only seen him three or four times, he has done a great deal toward selling you goods. He has studied you, taken enough interest in you to find out who you are, which is just as important in a service station as in a store.

### Parts Mean Much Business

Do any of us realize what a great volume of business we do through our parts department? If it was not for good men handling that department service stations would never be able to pay the way they do today. It is just as essential to have prompt and courteous treatment there as in the shop. Go into some places—it is a crime the way they talk to customers. Lack of attention, uncivil answers the clerk knowing the customer has to buy there. But let a fair damsel come in, a different story. A man likes to be waited on in a nice way.

If the service manager would fully realize what it costs to handle complaints, they would pay more attention to smaller things and in that way eliminate the biggest part of their troubles.

We should be ready and willing at all times to meet customers and see that they are properly taken care of.

Many employers think you should attend to detail work and watch practically every move the employee make. It can't be done. Make it a point to go over work tickets on completion and know that the customer has not been overcharged. It takes about 30 minutes a day.

### Leave Details to Subordinates

It takes time to build, and I for one, am not finished, just started. Have a reserve man for each important place. A one man organization is all wrong. A reserve service salesman, head tester, shop foreman and one or two in the stock room will make you independent of sickness, accidents, etc.

Just a word about the employee. Most of us overlook the fact that they are human so let us work with them,—help to educate them—make them more valuable not only to themselves but to the company. Impress upon them the necessity of being courteous, straightforward and always doing what is required—train them to do their work and the idea in front of him that you are advancing your own organization instead of going outside for new blood. Then they will realize the necessity of giving you dollar for dollar value. Have found it a mighty good thing to get them together and have a talk and have had many good ideas from them. We hold a school once a week and the boys take a great deal of interest in it. They realize more and more every day that the company is not only trying to make more money (which it is entitled to) but that it is trying to help the men make more for themselves. I have decided that I am not going outside of my own organization for men for special positions. Will boost my own and they will work harder for me and do better work.

### FIAT BACK IN RACING

Turin, Italy, Jan. 16—The return of the celebrated Fiat Company to automobile racing and the participation of this powerful Italian firm in the next International 500-mile Sweepstakes on the Indianapolis Motor Speedway is heralded by the signing of Louis Wagner, the grand old man of European racing, to build three cars for this concern under the new racing rules for the Indianapolis contest.

The Fiat company, once triumphant in the automobile arena, both in the United States and abroad, in the days when Lancia, Wagner and Nazzaro carried their gonfalon to victory, has not engaged in racing since 1912, when the late David Bruce Brown and Ralph DePalma were drafted from America to handle their speed creations in the Grand Prix de France. Both of the American drivers made a sensational showing in that event, Bruce-Brown winning on the basis of actual elapsed time but being deprived of the fruits of his victory because of having taken on gasoline along

the road, something that the rules of the contest did not permit.

In the United States, the name of Fiat was formerly one to conjure with, the early Vanderbilt and Grand Prize races finding the big red fliers of this make invariably among the leaders, and usually in first position. The late Bruce-Brown captured one of these speed epics, the Grand Prize of 1911, and Wagner accounted for another, the initial Grand Prize of 1908 at Savannah.

Wagner returned to racing last year, invading the United States as a member of the Ballot Quartet composed of Rene Thomas, Albert Guyot, and Paul Bablot, in addition to himself, that were favorites in the last Indianapolis 500-mile race, but failed to run true to form because of defective wheels.

Wagner himself went through the concrete safety wall around the Speedway in this contest when one of his wheels let go, tumbling down the embankment outside the track and overturning twice, but without injury. This was Wagner's second close call in the United States, his first having taken place during 1910 Grand Prize at Savannah, when he went off the road and overturned, sustaining severe but not fatal injuries.

Wagner is easily the foremost figure in European racing, since the death of Georges Boillot, the greatest driver Europe has ever known, and his return to Fiat, his first love, signifies a brand of competition in the Italian quarter that will make the other nations engaged in the Indianapolis speed embroglio look closely to their laurels.

### FEATURE SERVICE IN BUSINESS

Detroit, Jan. 17—Service will be the keynote in the conduct of the business of Williams & Hastings, Inc., new distributors of Hupmobiles, who are located temporarily at 969 East Jefferson avenue. While the energies of R. H. Williams and a competent staff of salesmen will be devoted to the sales end, Don M. Hastings will take personal charge of the service department and plans many innovations that will set a fast pace for other service men. Hastings is well qualified to take charge of service and maintenance having spent much time last summer and fall studying methods in vogue in many of the larger cities, devoting several months to a tour of Pacific coast cities where he gleaned much valuable information.

The new firm, which succeeds the Smith-Glines Co., as Hupp distributors, began operations Jan. 1 and since then has covered the entire state with dealer agencies, having been compelled to turn down many applications on account of lack of territory. Williams will have five experienced Hupp salesmen to assist in his department and the concern will have the benefit of the experience of H. W. Swanson and G. P. Crissman, former Studebaker employees, who accompanied Williams, formerly Detroit branch manager for Studebaker. Swanson is secretary-treasurer of the company and Crissman will be in charge of territorial work.



# Oil Room Continues as a Menace

## Gasoline Is Not the Only Danger in Garages, Paint Oils Often Causing Fire

IN considering the dangers attendant upon the storage and handling of oils, we are apt to think only of gasoline and naphtha. This is a great mistake, as every oil carries with it a menace to life and property and its handling should be safeguarded in every possible manner. Until this fact is universally recognized and all oils are handled in fireproof, evaporation-proof steel storage tanks, we must expect to pay an enormous fire loss due to the careless handling of these products. It is true that the danger of handling gasoline is greater than in handling other oils. This danger is so well known, however, that familiarity with it has in many cases induced carelessness, so that it is well that we consider the treacherous nature of this product that we may always be on our guard.

### "Familiarity Breeds Contempt"

Gasoline, unlike the other heavier petroleum products, throws off an explosive vapor constantly, even at extremely low temperatures. Five gallons of gasoline will generate 8000 cubic feet of gas, which, when ignited, expands to 4000 times this space. The explosive force of one gallon of gasoline properly mixed with air and compressed is equal to 83 2/3 pounds of dynamite or fourteen times greater than dynamite. This means that if you have 100 gallons of gasoline on hand, you are storing the equivalent in explosive force to 8366 pounds of dynamite. Gasoline is, in fact, more dangerous to handle than dynamite and there is more liability of an explosion. Dynamite will only explode from two or three causes which may be easily guarded against and which must occur in its immediate vicinity.

### Vapor Remains a Big Danger

The vapor from gasoline is heavier than air. It settles to the floor and runs along the floor much as a stream of water would, only that it is an invisible stream. This vapor will settle and remain in a depression in the floor or under the floor for days and even weeks, unless disturbed by a circulation of air, until a spark causes the accumulation of vapor to explode. This spark does not necessarily have to come from a lighted fire, but may occur through a person striking a nail in their shoe on a nail in the floor or other similar unavoidable causes. The records show that under certain atmospheric conditions, spontaneous combustion will occur in this accumulated vapor. A case is on record in which the gasoline fumes were carried outside of a building to a lighted lamp thirty feet away from the building, taking fire and flashing back to the building, which was entirely consumed. If you are handling gasoline in any way but the right way, you are in just this

position and you can never foresee when the blow will fall.

It is past understanding, in view of these facts, that many concerns, with their entire capital invested in the business, will give so little thought to safeguarding their interests. With the factory, shop or mill or mine heated, they will at night lock up this explosive in a warehouse or building adjacent to or connected with the main plant. After locking up fire and this explosive vapor together, they will, in effect wager their entire investment against the merely nominal expense of fireproof storage that this vapor and this fire will not get together.

Kerosene is not as dangerous as gasoline, yet at a temperature of 70 deg. or over it throws off an explosive vapor. At a higher temperature, say 80 deg. F., in order to properly ventilate a room in which there is an open tank of kerosene, there should be kept up a circulation of air equal to 200 cubic feet per minute for each gallon of the exposed oil. These figures vary, of course, with the volatility of the oil and the temperature of the air and oil. Such a circulation of air is not practical in the usual manufacturing establishment. Hence the necessity is apparent for evaporation-proof, scientifically correct storage for kerosene as well as for gasoline.

### Spontaneous Combustion Danger

All petroleum products, including lubricating oils, produce this explosive vapor. The danger from lubricating oils, however, is chiefly from spontaneous combustion where waste, sawdust or shavings are used to absorb the oils spilled on the floors. Many fires in factories and oil rooms have been traced directly to this cause, as it is a very common practice to neglect the accumulated refuse, which in time, bursts into flames.

Special equipment has also been designed for handling each and every oil in a manner best suited from the standpoint of economy, convenience and safety. The up-to-date merchant today is taking advantage of these appliances, so that we may in confidence look forward to a time when fires caused by careless handling of oils will be unknown.

The installation of a modern storage system for oils, etc., need not necessarily imply the outlay of large sums. We have found this "big investment" idea on the part of men in charge of industrial institutions has frequently prevented them from considering the purchase of equipment. It is not always necessary, or even advisable, to put in at one time all the equipment the management might feel would be needed ultimately. In many instances storage is provided for those oils or other liquids which most urgently require it. The balance of the equipment can be added

as finances permit or exigencies demand.

Modern storage equipment for handling liquids is really divided into two general types. One for handling volatile liquids, such as gasoline, naphthas, paint, oils and varnishes and the other for handling non-volatile liquids, such as lubricating oils.

### Special Tanks Needed

The first of the two general types requires underground storage tanks for gasoline or naphtha and above-ground storage for the paint, oils and varnishes. This arrangement usually meets with the demands of the various state laws governing this type of storage. Where underground tanks are required they should be cylindrical in design. If made of galvanized steel all seams and rivets should be carefully made and then soldered inside and out. If heavy metal is used much as three-sixteenths steel or heavier weights as conditions or the capacity of the tank may make necessary, then all seams and rivets should be carefully caulked. Storage tanks for volatile liquids require special care in construction. A tank may hold water or steam pressure, but it is usually unfit for volatile liquid storage purposes.

If above-ground tanks are essential these are made in rectangular shapes the height remaining constant and the width varying according to capacity desired. This arrangement permits the addition of other individual units to the system and does not destroy the uniformity of the battery or storage equipment. Rectangular tanks are made with the same care as the cylindrical designs.

### Accurate Check Provided

Specially designed pumps of either measuring type are connected by pipe lines to tanks buried underground or inserted in the top of tanks for above-ground use. Accurate devices are provided, on the measuring pumps for the delivery of desired quantities of liquid. Gear driven meters may be added for the purpose of checking consumption. Locks are supplied on both types of tanks and on the pumps as well. This prevents unauthorized usage and theft.

Where a battery of individual units is used, barrel track and barrel drainers are used in connection with small chain hoists. This makes it very easy to handle the barrels and drain them completely into the manhole of the tanks. This saves labor, time and liquid and prevents the loss of liquid due to the return of liquid in barrels which have not been properly drained by the old style spigot method. Dirt, dust and sediment are kept from the liquids, fire danger is entirely eliminated, valuable storage space is saved, labor is lessened, cost and consumption are easily arrived at.

# New England Tractor Situation Unique

## *Different Methods of Selling Required Here Than Those Used Elsewhere in the United States*

WHEN one moves on into New England one finds a new set of conditions which differ from any found elsewhere in the United States as far as the merchandising of tractors is concerned. Primarily it is not tractor territory. Yet tractors are being sold there, and lots of them.

Two sections in New England stand out preeminently as regions in which tractors have been sold and in which they will continue to be sold in increasing numbers. These are the tobacco growing sections of the Connecticut Valley and the potato growing areas in the Aroostook of Maine. Tractors have been selling for a number of years in both these regions and, indeed, virtually made their debut into New England there, as they sold very sparingly in other sections of the New England states until the last year.

One obstacle which stood in the way of tractor introduction in New England is the relative scarcity of dealers of the right kind. In fact, before the automotive dealers began to respond to the attractions of the tractor business this presented decidedly a serious problem.

### Few Implement Men in Territory

This for the reason that the retail implement dealer, until recently the almost universal factor in the ultimate distribution of farm operative equipment in the entire country west of the Allegheny Mountains, hardly existed in all of New England. In fact, there was no agricultural implement distributive organization which would be recognized as legitimate by western dealers. In all of New England there were hardly enough real implement dealers, or concerns engaged exclusively in the selling of agricultural implements, to need all of the fingers of one's two hands for their enumeration. Preeminently it was a region within which the so-called farmer agent dominated in the distribution of farm operative equipment.

To what a degree this condition made the situation difficult for the introduction of tractors is shown by a consideration of what the concerns which took on tractors were up against. Take the Curtis Mfg. Co., Worcester, Mass., for instance. This is one of the oldest and best known of the implement manufacturing concerns in the east. Some years ago it came into national prominence through connection with the manure spreader trade, but always it has been

By FRED M. LOOMIS  
(Motor Age Editorial Staff)

one of the most important of the eastern concerns engaged in the implement business. In New England proper the Curtis concern has between 500 and 600 trade connections, yet Mr. Curtis, Senior, told the writer that among these there were hardly a half dozen which could comply with the western definition of a retail implement dealer.

### Sales Made Direct

It happened, therefore, when this concern took on the Heider tractor some two or three years ago that nearly every sale had to be made direct. The prospect was investigated without the interposition of a dealer, the sale made direct with him and the entire deal handled by the home office. This was slow work and made the introduction of the tractor difficult, even though operations were for a time confined almost exclusively to the relatively nearby sections of the tobacco growing regions of the Connecticut Valley. Here, however, a number of Heider tractors were sold and at last accounts were proving to be very satisfactory.

For 1920 the Curtis company will sell also the Indiana, conceiving it to be possible that there should be a considerable demand for a small capacity, general purpose tractor of this type. Also the company thinks its peculiar sales organization will be more successful with such a machine to sell than it could be with a larger type of tractor.

Force is lent to this conclusion by the nature of the farms in New England. Take Worcester county, Massachusetts, as an example. This is the largest agricultural county in the state, yet the cul-

tivated area on the average farm is considerably under 10 acres. An authority on conditions there says there are hardly more than twenty-five or thirty farms in the entire county which can use a tractor economically.

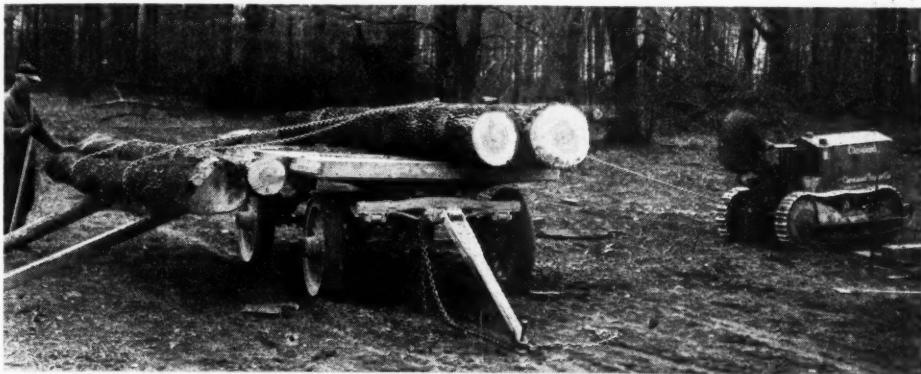
This conditions is mitigated to some extent by the relatively large number of estates scattered throughout that section of Massachusetts. For the most part these places are playthings of wealthy men and tractors are being bought for use on such places, not because they are either useful or economical, but just because they are the latest thing in farm equipment. A tractor is added for just about the same reason that the current model motor car is bought.

### Tractor Possibilities Limited

In fact, outside the Connecticut Valley and the Aroostook exceedingly small farms are the rule. A dealer up in New Hampshire says his territory would be ideal for tractors were it not for the fact that half of it stands on edge and the other half is under water. So, what with hills, lakes, stones and wilderness, there is not much of a place for a tractor to operate in either New Hampshire or Vermont.

The limited possibilities for the tractor, agriculturally speaking, in New England is evidenced by the fact that the highest estimate made upon tractor absorption for that territory during the year 1920 looks about like the following:

Maine .....	550
Massachusetts .....	150
New Hampshire .....	150
Vermont .....	100
Connecticut .....	150
Rhode Island .....	100



One of the New England uses of the tractor—hauling logs in the north woods



But it must be remembered that attempts to introduce the tractor into New England were undertaken later than they were in most other sections of the country. The fact that tractors were made almost exclusively in the west, coupled to the fact that few western implement or tractor manufacturing companies had satisfactory trade connections in the far east, accounted for this condition. Then, too, New England is necessarily, for the most part, a territory in which there can be a demand for nothing but the small 2-bottom tractor, and few of the early tractors were small enough to meet the demand. This is the International Harvester Co. and Deere & Co., two concerns which had, perhaps, the largest sales organizations in the territory, found out. The International never got very far in the New England trade until it brought out the International 8-16, and Deere & Co. had its hopes nipped by the financial collapse of its Boston trade connection, the Ames Plow Works. To be sure, the J. I. Case Threshing Machine Co. had made some progress in that region, but even its product was too large for the New England trade outside of the tobacco and potato growing sections.

#### Two-Way Tractor Plow Needed

The peculiar character of many of the farms in New England demands specialized tools. Notable in this category is a 2-way plow for use on hill sides. Up to the present year no 2-way plow of tractor capacity had been designed. All were adapted for horses only. During the last few months, however, a tractor 2-way plow has been in process of development by the Oliver Chilled Plow Wks., and this will help in the future to put the small tractor across in New England.

However, it happens that there the tractor is finding a place in other fields which appear to be of growing consequence. Place has been found for many of them in industrial plants. So large is the promise of this outlet that one tractor distributor in Boston told the writer that fully half of his future trade would be of this character.

Tractors are being used industrially for all sorts of things. They do the hauling around factories and factory yards, substitute for the locomotive in shunting cars, plow up the meadows which are flooded for natural ice cutting and for numberless other things. While investigating this phase of tractor demand at Boston the writer met a man who was trying to rig up some sort of a contraption which would permit him to use a tractor for digging clams.

#### High Cost of Selling

Up in Maine they say: "Maine and the Aroostook." By "Maine" they mean the coast region, which is mainly shipping and summer resort. By "Aroostook" they mean that topmost county of the state, larger in superficial area than the entire state of Massachusetts, where most of the farmers grow little but potatoes. Between these two sections there are 500 miles, more or less, of wilderness, given up to second growth spruce, lakes and moose.

A few tractors are sold in the coast region to go onto estates. A distributor at Portland, who ranks as one of the big tractor distributors of the state, says it is nothing unusual to be called upon to load a tractor onto a truck and transport it from twenty-five to forty miles to give a demonstration. This so enormously increases the overhead cost of selling tractors in that section, considering the few that can be sold there, there were it not that the company could recoup itself by profits made on sales in the Aroostook, it would be impossible to make any money in the business.

The Aroostook is another story. Probably 90 per cent of all the tractors in the present use in Maine are owned here. Grass and grain enough for local feed demands are grown, but the predominant crop is potatoes. Farms of from many hundreds to 1000 acres in size are common.

You will be told that up in the Aroostook there is only July and August and the balance of the year winter. However near the truth this may be, the writer found two feet of snow on the ground up there in early October. This

means that the season is very short and that the tractor is an advantage. The heaviest work, however, is harrowing, and as this comes in the spring when the horses are least able to stand the strain of such hard work, it has been found advantageous to substitute the tractor for the horse. Also many of the potato growers want to use a tractor for digging. One tractor, the Cletrac, answers both these purposes admirably and for that reason is perhaps the best selling machine at this time in that section. It works well because of its track laying on the plowed ground, and its tread is such that in digging it can straddle a potato row and draw the diggers directly behind it. Most of the wheel tractors are compelled to use an offset drawbar for digging.

At the same time a considerable number of wheel tractors are sold in the Aroostook. Notable among these are the International, the Avery, the Case and the Fordson. An attempt this year will be made to introduce the Steel Mule.

#### Tractor Dealers Are Motor Men

With the exception of the Curtis Manufacturing Co., Worcester, Mass., the tractor business throughout New England is overwhelmingly in the hands of motor car distributors and dealers. Such concerns as the Jackson Motor Service Co., Boston, Massachusetts Motor Sales Co., Worcester, Mass., and Providence, R. I., E. E. Wentworth Corporation, Portland and Houlton, Maine, Manchester Auto Co., Manchester, N. H., and D. W. Flint, Providence, R. I., are typical. These concerns all are automotive. A few tractors are represented through branch houses, as is the case with the International and the Case.

The tractor business in New England is essentially a distributor or a branch house proposition. In mighty few places is there or can there be a trade on tractors of sufficient magnitude to warrant the dealer putting in either a sales or a service organization. Indeed, outside of the motor car industry there are few dealers and certainly none that can give the necessary service on tractors profitably. The trade must look for both sales and service to the central distributors or to the branch houses. The tractor distributor therefore may be expected to persist in New England long after he shall have been practically eliminated from the trade in all other sections of the country.

But New England states are small—distances are short—the roads are excellent, except only in certain sections of Maine. A service man can reach trouble by motor car in a short time from Boston, Portland, Worcester, Providence or New Haven, all distributing points, so there is not the real need for the dealer able and willing to give service as there is in other sections of the country. Of course, up in the Aroostook, which is a thing apart by itself, there must be local branches or distributors, and there are.

But it is not in New England alone

(Continued on page 41)



Another use of the tractor—cutting ice in Northern Maine

# Garage Planning

## Service Station Arrangements

MOTOR AGE is receiving many inquiries or garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

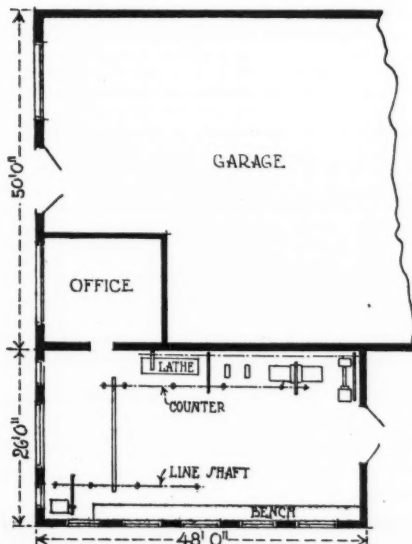
And how much of an accessory department is anticipated.

### No. 173

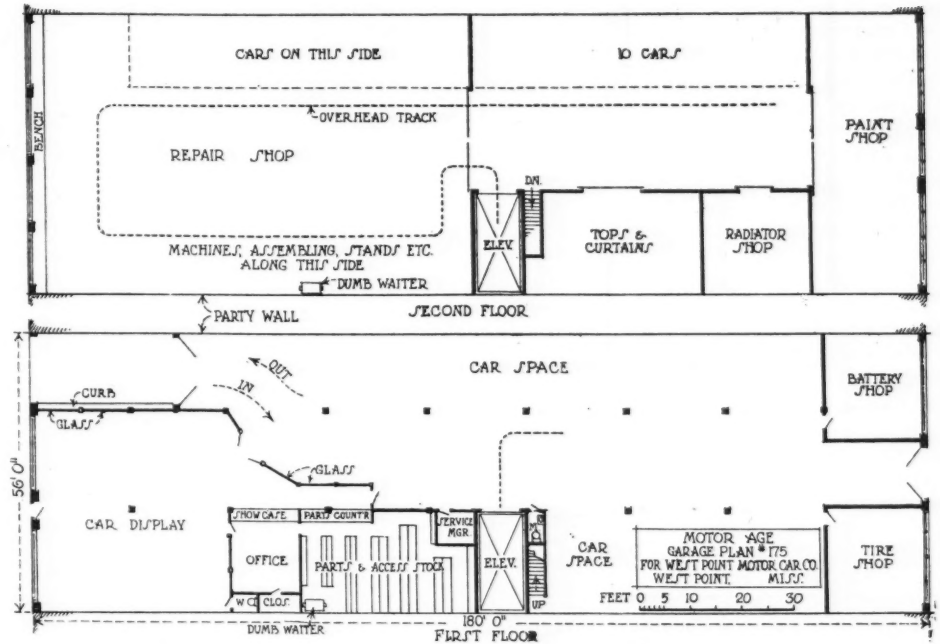
#### IMPROVEMENTS SUGGESTED

We enclose a little sketch of a garage that is partly completed and would ask you, if possible, to give this customer a blue print of such a layout and give him some suggestions as to setting the machinery in the work shop.

He wants to set his engine in the N. W. corner of the work shop and get his drill, if possible, and burning-in stand in the S. E. corner. If you could furnish a blue print offering some suggestions as to the best way to line this up we would



No. 173. Garage plan with complete machinery equipment



No. 175. Two-story plan for Ford sales and service station

be pleased to have you either take it up direct with our customer or send the information to us.—Orr Iron Co., Evansville, Ind.

Your layout, as shown, seems very poor. In the first place, an aisle running through a 21 ft. shop cuts the space up so that it is of not much use. The machines will have to be strung along the sides of the room as best they can without much regard to handiness or efficiency. Then, too, your line shafting and belts will be unreasonably long and heavy. The burning-in stand, especially, calls for 10 to 15 h.p. and being at the

end of this long line, the gear will of necessity be too heavy to run smoothly.

We recommend an arrangement shown at the right, with the front door closed, and the machinery, including the engine, all grouped in this end. Access to the shop is through the garage, and there is room for three or four cars to be washed on, besides plentiful equipment. The back door may be retained if desired, but by closing the front door you keep out loiters who interfere with the men and keep them from doing their best work.

### No. 174

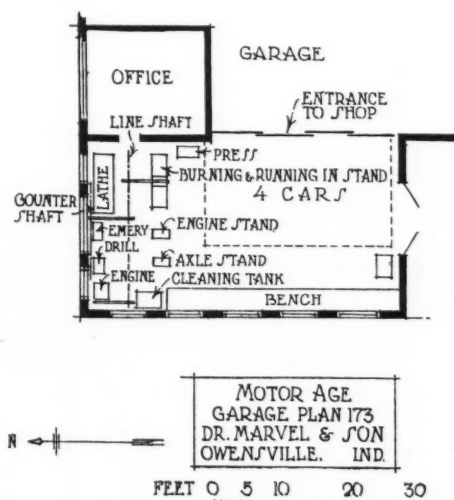
#### PLAN FOR CO-OPERATIVE GARAGE

We are going to build a first class garage and service station and would be pleased to have you help us with a plan of same. We expect to operate on a co-operative basis, selling gas oil, tires and tubes to members at cost.

For the above reason will want a corner filling station. We are enclosing a rough outline of lot and what we will require.—Moore & Clanton, Nampa, Ida.

This plan needs little explanation as it is complete and comprehensive. The storage space is all accessible to the entrances and exits and elevator and there should be no confusion.

The elevator location we have changed, too, so it is more convenient to both aisles and can be entered direct from the side entrance. This would be the logical entrance and exit for basement or second floor tenants unless they should need gas on the way out.





## No. 175

## FOR FORD AND FORDSON STATION

We have a vacant lot between two walls 56 by 180 ft. Please give us a plan for a two story building placing stock room, show room office, shop and all equipment for Ford sales and service.—West Point Motor Car Co., West Point, Miss.

It is unfortunate your lot is so narrow, not that it is too narrow but that the same area could be used to better advantage in a wider space. But after all the only real disadvantage is in the narrow show room and lack of window display space.

We have given the aisle width enough so cars may enter and leave at the same time. This is almost necessary, as with such a large building and the volume of business it will handle there is sure to be congestion if the passage is narrow. When a customer starts to leave and meets another half way and is obliged to back in again he goes away with a bad taste in his mouth.

You probably do not anticipate much of accessory sales since you do not mention them, but it would be well to have a show-case at one side of the office for little things that customers need more to keep them from going elsewhere than for any special benefit from the sales.

The service manager's office is conveniently located for the inspection of incoming cars.

We presume you will use the walls mentioned as party walls in which case you must see that they are stiff enough to carry your roof trusses. In case they are too weak they can be reinforced by concrete pilasters well attached to the old walls or the posts shown in first floor plan can be extended up through the second floor to support the roof in which case the walls would be all right as they are.

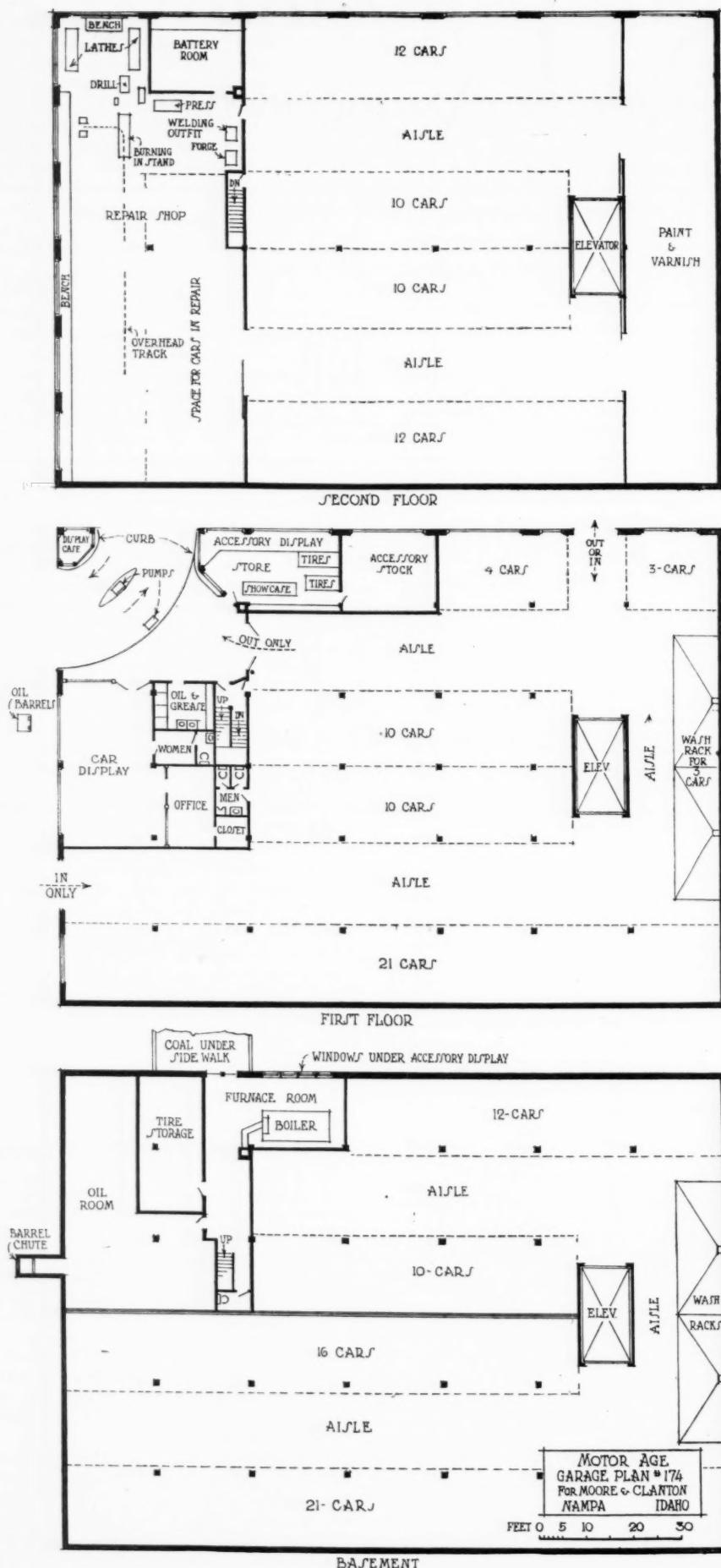
## No. 176

## HANDLING TRANSIENT TRADE

We have bought a piece of property 50 by 140 ft. situated on ten great automobile routes and tourists must pass this point on their journeys. The lease on the property lapses May 1, 1920, so we will have time to make proposed plans. What we would like to get is a good plan for parking automobiles and trucks for storage and handling the transient afternoon and evening trade and get arranged so that each car is independent and can drive out or in and not interfere with the other cars in entering or leaving. We want our basement and walls to hold two or three stone buildings, but will build only basement and first floor now with roof over first floor, level floor space to accommodate all the cars we can, convenience for ladies, office and show room, glass front and front entrance door operated from its office to let in and out any trucks and automobiles built. Front two story upper half for vulcanizing, top and curtain works and radiator repairs.

We have sketched off a plan of our ideas and ask you what it will cost to build this garage and dig out the old walls and dirt, build a foundation while we are at it suitable to go higher if we want to.—Howard & Deems, Muscatine, Iowa.

If you intend to build a second story later it might be well to put in your posts and use them to support the roof and at the same time get used to their presence.



No. 174. Plan for garage and service station operated on co-operative basis

Of course if you want to have your upper floor post free and support the roof on trusses, then you had better build the trusses and roof complete and raise it later to the new position.

You have said nothing about a repair shop in your letter but with all the other side lines that you intend to have we think it must be an oversight and suggest that you build your second floor back as far as the second row of posts at least and use this space as a repair shop. There might be room for the radiator and tire shop also unless your business is large.

As to making your basement walls and

footings heavy enough to support future additions, much will depend upon the material used and the nature of the soil. A local contractor can give you better information on this subject than we can. You will also have to consult local men in regard to building costs, they are so different in different parts that any information we could give you would have little value in your locality.

A building which we know of in central Ohio is being built at a cost of about \$65,000. It is 10 per cent larger than this plan but rather more elaborate and complete as to sales rooms, offices and has fine though not elaborate front.

tractor trade because they and they only are going after this industrial demand in the right way.

Eastern New York, Eastern Pennsylvania, New Jersey, Delaware and Maryland comprise an attractive field for the tractor. Many machines already have been sold in these states and the future gives promise for a largely increased demand. While there are more regular dealers in this part of the east than there are in New England, still something of the same conditions pertain. It is told by a tractor distributor in Philadelphia that at the earnest solicitation of a stormy petrel editor of an implement paper in that city he was induced to agree to trying out the so-called implement dealers in that territory before giving the agency to any other kind of dealer. After a year's trial every implement dealer but one was dropped from the list and replaced by a motor car dealer.

In the Carolinas and in Virginia old time dealers are few and hard to interest. Some of the tractor distributors in that section are doing pretty much as the Curtis company at Worcester, Mass., is doing, and are selling tractors direct. For instance, John E. Bowles, Cletrac distributor at Charlottesville, Va., is doing just that.

#### Bowles' Selling Plan

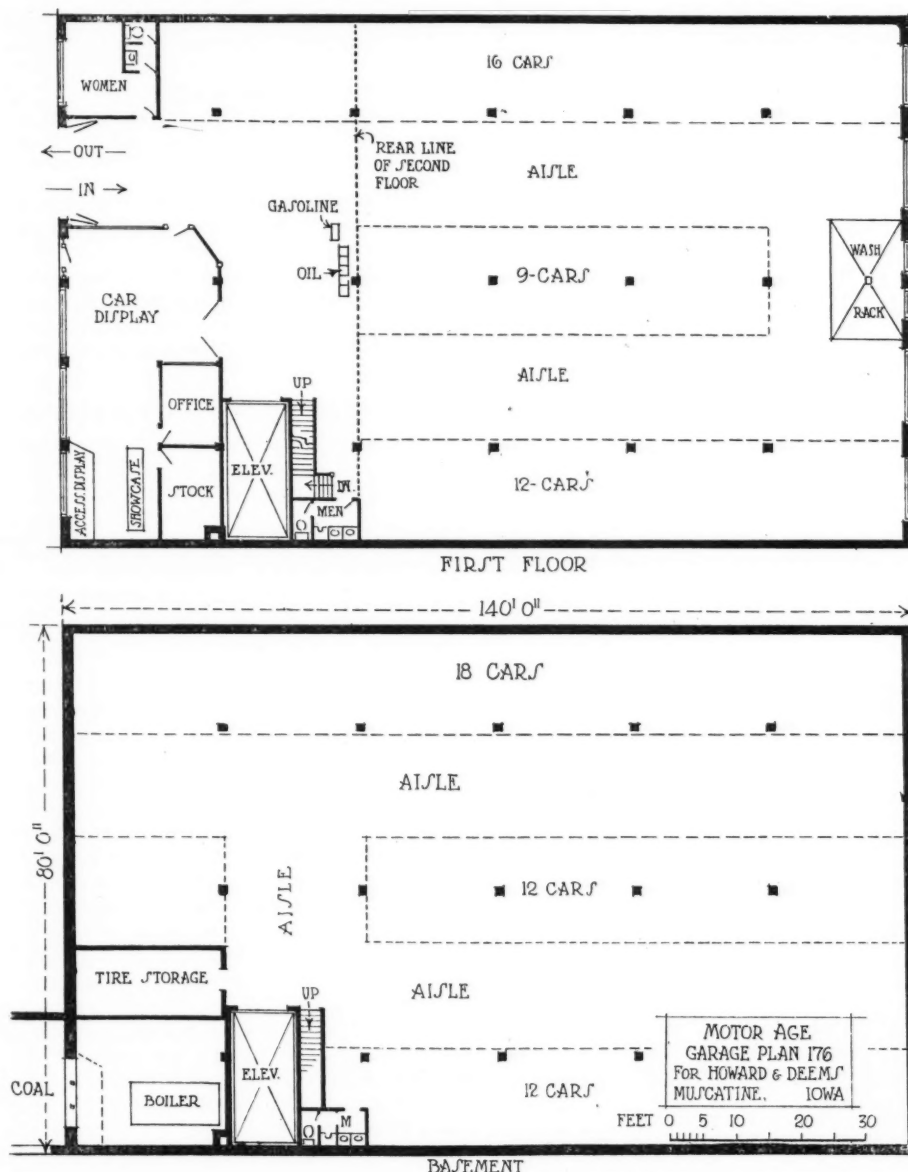
In that section of the old Dominion tractors are used extensively for orchard cultivation. Bowles sells a tractor to an orchardist, tells him to use it, show it to his neighbors and to talk it as favorably as he can, but never try to sell. However, when he thinks a man has been interested to the point where he has become a prospect, he notifies Bowles. The latter sends a man and if a deal ensues the orchardist is given a commission. Bowles says he has customers who in this way have sold 10 or a dozen tractors apiece for him.

This plan would meet with instant depreciation from the dealers in the west, but with conditions what they are in the east it is easy to get away with it there.

These mid-Atlantic states too are the field for the small-bottom tractor. Tractor sales during the year 1919 for these states are estimated to have been about as follows:

New York .....	2000
Pennsylvania .....	2200
New Jersey .....	400
Delaware .....	600
West Virginia .....	600
Virginia .....	1400
North Carolina .....	1400
South Carolina .....	1200

A probably development in this part of the country will be a big demand for garden tractors of the Beeman or Utilitor type. Truck farms are very numerous and the distributors think there will be a big sale on these small machines. At any rate a number of the big automotive distributors have taken on the garden variety of tractors and are planning aggressive selling campaigns for the ensuing year.



No. 176. Plan for garage with transient trade

## New England Tractor Situation Unique

(Continued from page 38)

that the industrial demand for tractors will be a big factor in eastern tractor trade. There is a present active and a growing industrial demand for tractors in and around New York, Philadelphia, Baltimore and other eastern industrial centers. The writer found that in many places the motor car-tractor distributors

were installing industrial departments, putting a competent engineer, who was able to figure on industrial installations, in charge of these departments and intending to push this part of the business hard. In this respect the motor car dealers are again giving evidence of their greater vision of the possibilities of the



# The Readers' Clearing House

## Questions and Answers

### WANTS HIGH TENSION MAGNETO

**Q**—Do the Bosch people make a high tension magneto for a four-cylinder motor that dry cells can be used with for starting?

**2**—If so, what model is it? If not, what is the model of their dual system magneto that dry cells can be used with?

**3**—Kindly give dimensions of this magneto that dry cells can be used with? height from base to center of driving shaft. Desire a magneto with variable spark.—J. J. Mather, Springboro, Pa.

**1**—All that is required is a special switch and coil, then an ordinary DU Bosch magneto can be used, as shown in Fig. 3, wherein a vibrating coil is used. In this case there is a bridge across the terminals A and B, which connects in the battery, the breaker of the magneto being used, as well as the distributor. Just as soon as the engine is started the switch must in all cases be turned to the magneto mark, thus cutting out the coil. When it is desired to stop the engine the switch bridges the terminals B and C and forms a ground, thus cutting out the current.

**2**—This is explained above.

**3**—The DU4 is 169 mm. high, 80 mm. wide and from the base to the center of the shaft it is 45 mm., which is equivalent to about 1 7/8 in., figuring 25.4 mm. to the inch.

### REPAIRING STORAGE BATTERY

**Q**—A storage battery was turned over on side and part of the solution in one cell ran out. I filled it with water and put on a charge, but cannot get it above 1150. The other two cells are up to 1300. The cell in question does not leak. What can I do to get this cell up again? Could I add more of the solution to this cell? If so how much and what kind of acid? O. W. Lloyd, Saxton, Pa.

Our advice is to ship your battery to the nearest reliable battery station and have it properly cared for and built up; it is not a layman's job, by any means, to put it back in shape after some of the electrolyte has been spilled. However, it can be done, but what is the condition of the plates in that particular cell with part of the electrolyte gone for some time? That will have to be told by a battery man's examination. You will have to use electrolyte of 1.250 specific gravity, and not water, to make up for the loss. Then you will add distilled water and charge at the proper rate for the make of battery. Electrolyte as used in all types of batteries consists of a mixture of pure sulphuric acid and distilled water. Concentrated sulphuric acid is a heavy, oily liquid with a specific gravity of 1.835. To prepare this for use the 1.835 acid is mixed with water in proportion to bring the gravity to that of the electrolyte in the other cells. If this were 1.250 then the proportion would be 3 1/2 parts of distilled

Conducted by Roy E. Berg  
(Motor Age Editorial Staff)

**THIS** department is conducted to assist dealers, service stations, garagemen and their mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Motor Age reserves the right to answer the query by personal letter or through these columns.

### The Electric System

water to 1 part of acid. You will have to have a hydrometer and other apparatus. The water is placed in an earthen jar and the acid is added to the water by means of a hydrometer syringe, holding the nozzle under the surface of the water. The solution is then stirred with a glass rod or clean stick. The syringe is rinsed and the strength of the solution is tested. If it is about 20 deg. Baume allow it to cool, when it will be stronger. Add acid for greater strength and water to weaken. You can see that

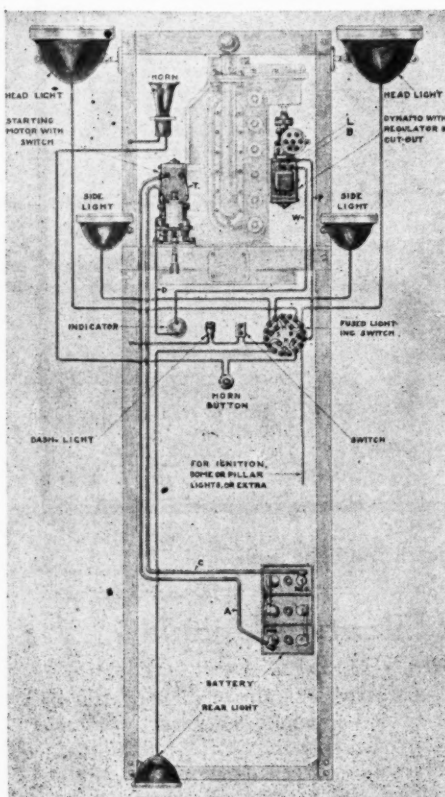


Fig. 1—Typical diagram of Gray and Davis starting, lighting and ignition system on six-cylinder car

it will be better to let a battery man tackle the job and have the battery right all the way through.

### WIRING ON CADILLAC

**Q**—Publish wiring diagram for 1913 Cadillac car. Car has double ignition.—Chas. E. Morris, Ardmore, Okla.

The wiring for a 1913 Cadillac is shown in Fig. 5.

### WIRING OF MAXWELL

**Q**—Publish wiring diagram of Maxwell car, six-cylinder, model 6-50 with Gray & Davis ignition system.—C. A. Miller, Minneapolis, Minn.

This is shown in Fig. 1. This is a general Gray & Davis diagram, and while these connections are not identical with the connections on this model Maxwell, still the year is the same for both diagrams under consideration, and there should be enough information here to assist you.

### IN REGARD TO MAGNETO IGNITION

**Q**—Would it be advisable to equip an eight-cylinder, 1918 Oldsmobile with magneto ignition? I have been told that magneto ignition is not practical for an eight-cylinder V type engine. However, I noticed that De Palma's Packard car, twelve cylinder engine, that made 149 mph., was magneto equipped.

**2**—Publish power curve 1918 Oldsmobile 8 Pacemaker, model 45-A, gear ratio 4-6 to 1. L. D. Eberly, Paris, Idaho.

**1**—It is hardly the province of MOTOR AGE to advise regarding a matter of this kind, but it is not true that a magneto is not practical for an eight-cylinder engine. A good deal will depend upon what you desire to accomplish, but the fact that the majority of cars are fitted with battery ignition of one sort or another is sufficient evidence of the success of that type. There are arguments for and against each form. What you might do—and it is frequently done—is to install a simple current generating high tension magneto as a source of current and use the distributor now on the car. Then if anything happened to the magneto it would be the work of a moment to switch one wire and use the battery through the distributor.

**2**—This power curve was shown in the issue of November 27, 1919.

### PUTTING BATTERY IN STORAGE

**Q**—What is the proper way to put a battery in dry storage?

**2**—Is it practical and what are the charges at most service stations? Oliver Sveen, Lake Mill, Ia.

**1**—This subject was covered in a recent issue of MOTOR AGE.

**2**—It is necessary to keep the battery fully charged, and filled with water. This means that a trustworthy service station should have the job, so the battery can be watched. If left in a cold place and not fully charged the battery is very apt to freeze and be ruined.

### IGNITION SYSTEMS FOR FORDS

Q—Is there any ignition device besides a magneto that can be used on a Ford to eliminate the vibrator coils? N. H. Hormel, Oakdale, Pa.

If you do not wish to use a magneto, there are a number of other ignition devices made especially for Ford cars and one of the simplest and most efficient is the Atwater Kent apparatus. This is made so it can be installed by anybody, having brackets to fit, so that there are no holes to drill and no fitting. It replaces the Ford timer and is made in Philadelphia.

### WIRING FOR MITCHELL

Q—Publish wiring diagram of the 1915 Mitchell four-cylinder car. The car is equipped with a 12-volt Apeldo ignition system. W. M. Wheeler, Wilson, N. Y.

For this diagram see Fig. 4.

### WIRING FOR COLE

Q—Publish wiring diagram of a 1913 Cole car, six-cylinder with Delco ignition system. F. Stange, St. Louis, Mo.

This is shown in Fig. 2.

### ELECTRIC HEATER

Q—Is there any car on the market that has an electrical heater as regular equipment to make starting easy in cold weather?

2—What causes a Chalmers car to start quickly?—R. G. Bowman, Shreveport, Ia.

1—We know of no car that is so fitted as regular equipment, but there are several devices that can be easily installed.

2—If you mean when cold, it is probably due to good carburetion, tight engine and the ignition in good shape; if when warm the hot spot feature is probably responsible for the good behavior.

### H. T. MAGNETO ON FORD

Q—In rebuilding a Ford, changing body design and engine, what kind of magneto do you advise?—Hubert Smith, Memphis, Mo.

The Bosch company makes a complete outfit that can easily be attached to any Ford and this will serve your purposes. Or you can put on an Atwater Kent apparatus with less work and this will give satisfaction.

TO assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

### THE ELECTRIC SYSTEM

J. J. Mather.....Springboro, Pa.  
D. W. Lloyd.....Saxton, Pa.  
Chas. E. Morris.....Ardmore, Okla.  
C. A. Miller.....Minneapolis, Minn.  
L. D. Eberly.....Paris, Idaho  
Oliver Svonn.....Lake Mill, Ia.  
N. H. Hormel.....Oakdale, Pa.  
W. M. Wheeler.....Wilson, N. Y.  
F. Stange.....St. Louis, Mo.  
R. G. Bowman.....Shreveport, La.  
Hubert Smith.....Memphis, Mo.

### CARBURETION

Dell Williams.....Bartlesville, Okla.  
J. J. Richmond.....Muscatine, Iowa

### MISCELLANEOUS

R. W. Kearse, Kearse's Garage.....  
Ehrhardt, S. C.  
A. B. C. Motor Co.....Kansas City, Mo.  
A. B. Duke & Co.....Chinook, Mont.  
Graulich Auto Sales Co.....  
Evanston, Ind.  
J. P. Miller.....Lemoore, Cal.  
George R. Jackson.....New Boston, Ill.  
F. H. Silvernale.....Currie, Minn.  
Overland Motor Sales Co.....  
Mayfield, Ky.  
A. Reader.....Eufaula, Ala.  
Geo. M. Good.....Miami, Ariz.  
Harold Cockerline.....  
G. B. Wiles.....Sheboygan, Wis.  
Alva Eidson.....Grand Junction, Colo.  
Roscoe C. Morgan.....Corydon, Iowa  
Robert E. Clawson.....Springfield, Ill.  
D. W. Bell.....Johnson City, Tenn.

### REBUILDING

Ray Frates.....Brule, Neb.  
Hubert Smith.....Memphis, Mo.  
J. J. Foster.....Springfield, Ill.

## Carburetion

### ADJUSTING OLD CARBURETER

Q—Publish illustration and explain the adjustment of the carbureter on 1910 Cadillac. — Dell Williams, Bartlesville, Okla.

To adjust the carbureter first, close needle valve, see Fig. 7, and then open it three-quarters of a turn. Place the spark and throttle levers on steering wheel in the correct position for starting and start the engine. Allow the en-

gine to run several minutes until air intake pipe between the exhaust pipe and carbureter is warm its entire length. Then close the throttle and place the spark lever in the extreme retarded position. Set the adjusting screw 19 so that the engine will run about 250 r.p.m. with spark and throttle levers in this position.

Next, close the needle valve 22 a little at a time until engine begins to miss, due to a "lean" mixture. Then open the needle valve a little at a time until the engine again fires regularly. After this adjustment has been correctly made, needle valve 22 should not again be moved during the carbureter adjustment.

Next, with the throttle still closed, pull the spark lever on the sector to C and speed the engine up to about 500 or 600 r.p.m. by pulling the throttle lever down a little. Now with a pencil slightly depress the leather air valve 7. If the engine speeds up, it indicates that the spring 8 is too stiff. This should be weakened by loosening the lock nut, 11, and slightly unscrewing the nut, 10, being sure to again lock nut, 11, after the adjustment has been properly made.

If, on the other hand, the engine slows down immediately upon holding the leather air valve down slightly, it indicates that the spring, 8, is too light. This may be made stiffer by loosening the lock nut, 11, and screwing up on the nut 10, being sure as before to lock the lock nut 11.

When the tension of the leather air valve spring 8 is correct and the leather air valve 7 is slightly depressed, no change will be noticed in the speed of the engine for a few seconds and then it will begin to run slower.

With the adjustments made for low and intermediate speeds, next consider high speed. With the spark lever still on center, open the throttle wide, having previously loosened the lock nut 13. Screw the nut 12 first down until the engine slows up because of too much air. Then up until the engine speeds up and beyond until engine slows up very slightly. Then lock the nut 13. By cutting the air down to a point a little less than seems to give the highest speed when engine is running idle, it will be found that the engine will pull and "pick up" better, although the car may not run quite so fast as it would if the carbureter were given a little more air.

The engine should never be allowed to run idle with spark at or near center and throttle open longer than is absolutely necessary to make this adjustment.

In very cold weather it may be found necessary to slightly increase the opening of the needle valve 22 if the adjustment has been made in a warm place.

After very long service, there may be a slight amount of wear at the point of the needle valve and its seat. When such wear does occur to any extent it may cause the gasoline level to rise. If worn sufficiently it will cause the gasoline to overflow out of the spraying

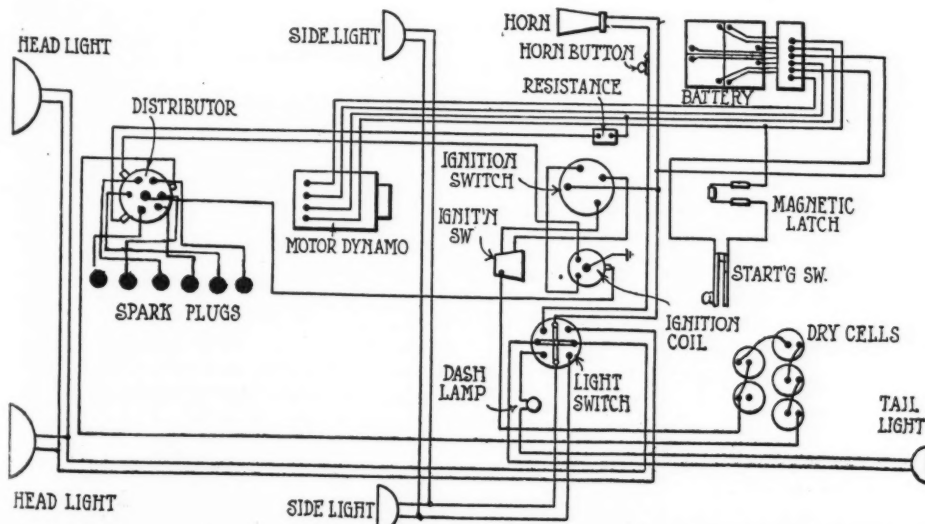


Fig. 2—Diagram of Delco connections used on a 6-cylinder 1913 Cole



nozzle and then out of the bottom of the carburetor. When this occurs the gasoline level should be adjusted.

An adjustment has been provided for the needle valve, which admits the gasoline into the float chamber. The weight 35 on this valve should be so adjusted that the gasoline level will be maintained in the float chamber at a point so that the gasoline will not run out of the spraying nozzle. The best action will be obtained when the chambered portion in the top of the spraying nozzle is about half filled with gasoline as shown by dotted lines at A, or it may be as much as 1-32 in. below that point. The adjustment will not have to be altered excepting when the needle point or needle seat becomes badly worn.

If gasoline runs out of the carburetor after the engine has been standing, it indicates one of two things. Either there is dirt under the gasoline inlet needle or the float is not properly adjusted. In the latter case the gasoline level should be lowered by adjusting the float as above directed.

Q—A late 17 Chalmers sedan needs a new carburetor. Would you advise installing the same make and type of carburetor or the same make of an improved type? J. J. Richmond, Muscatine, Iowa.

#### LATE CARBURETOR BETTER

Gradually the quality of fuel is being lowered and to meet this state of affairs the makers of carburetors are endeavoring to improve their wares to handle the poorer grade of gasoline. There are so many good makes of carburetors on the market that you will not be making a mistake in selecting any one of half a dozen popular makes and you should naturally be able to obtain better results.

### Miscellaneous

#### LUBRICATING OILS

Q—Has a lubricating oil of an asphalt base any advantage over one with a paraffin base, or vice versa?—R. W. Kearse, Kearse's Garage, Ehrhardt, S. C.

It is a matter of refining and not of base; that is, either good or bad oil may come from either an asphaltic or paraffin base. A direct answer to the query would be no.

#### ALIGNING WHEELS

Q—What formula do you advocate for the gathering or aligning of front wheels on passenger automobiles using pneumatic tires? We have had several varied opinions from various automobile engineers, and expert mechanics, and would like the advice of some one whom you consider authority on this question. We are distributors for Chandler and Cleveland cars in this community and take it for granted that a formula that applies to other makes of passenger cars will be applicable to our cars as well.—A.B.C. Motor Co., Kansas City, Mo.

There is a pretty well defined rule, if we understand your question, as to what should be done to align wheels so as to avoid tire wear and permit correct steering. This was fully explained and diagrammed in *MOTOR AGE*, November 27. As a general proposition the wheel felloes should be from  $\frac{1}{4}$  in. to  $\frac{3}{8}$  in. closer in front than at the rear; that

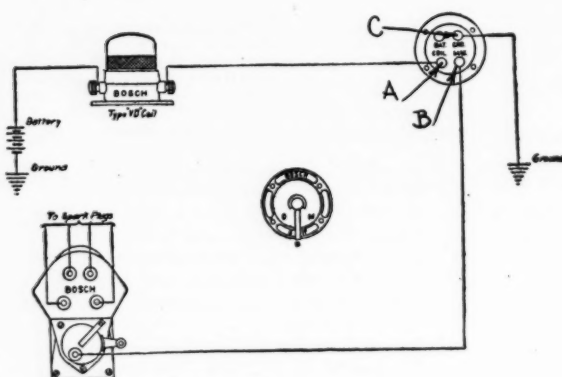


Fig. 3—Connections of Bosch dual system using coil

is, they should toe in slightly. They should also be cambered about 3 deg.; meaning the top should be spread outward a little more than at the point of contact on the ground. There is one very important matter to be considered and which is too frequently overlooked. This is to have the steering arms correctly set in relation to the back axle, else the car cannot be steered properly and wear on tires will come except when

the car is moving forward in an absolutely straight direction. The steering arms will be set correctly when a line from the center of the kingpin and directly over the center of the pin in the arm, where the tiebar connects, meets a similar line from the other side in the center of the back axle. This is explained in the issue referred to.

#### NOISE IN PUMP SHAFT

Q—In a Buick car, model H145 the pump shaft makes a great deal of noise when engine is running idle or very slow. The car has been run only 1000 miles and should not need new timing gears. By packing pump shaft about once a week eliminates this noise. Is there any other means of stopping same? D. W. Bell, Johnson City, Tenn.

See if the pump shaft is not out of alignment. You are right, the gears should not need renewing. Careful investigation along the lines of alignment will probably find some little difficulty that can be easily remedied.

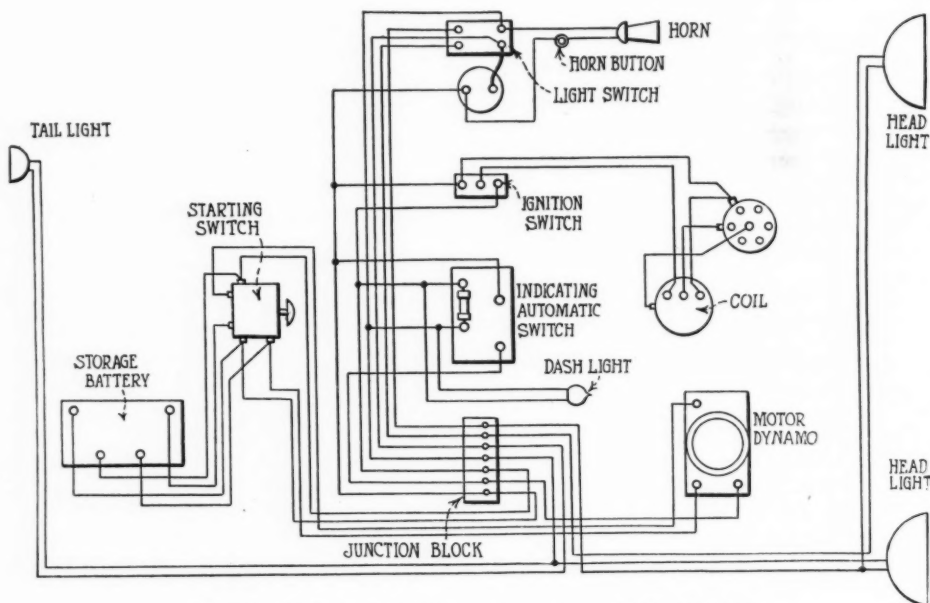


Fig. 4—Splitdorf Apelco system on a 1915 Mitchell

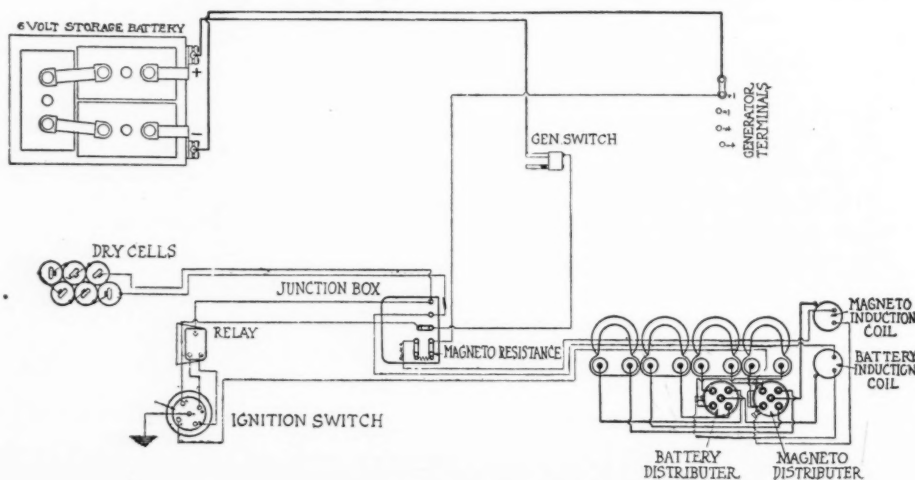


Fig. 5—Delco connections used on 1913 Cadillac

## Do V Type Engines Wear as Long as Vertical Type

Q—Have eight-cylinder cars more wear on the engine than six-cylinder cars?

2—Which is the more powerful, the four, six or eight-cylinder, all with the same piston displacement?

3—Which uses the most gasoline? Frank O. Randall, Dodge City, Kans.

1—Not unless you consider the fact that there are more parts; yet, these are as a rule smaller for on an eight of similar power than in a six. Theoretically the bearings on an eight ought not wear as much as those on a six or four because the blows from the piston are lighter.

2—There are too many things to be taken into consideration to determine

this. There might be two different makes of engines, six and eight, and either might have more power than the other, even with the same displacement, due to design, quality, carburetion, ignition and other things. Two engines of the same cylinder sizes, made in the same shop, may have a vast difference in power. One may be a slow speed engine, another a high speed; one may be designed for truck use and another for racing. Valve setting, compression, sizes of ports and other things would have to be taken into consideration.

3—The above applies in this case also.

## ASKS ABOUT CONTINENTAL ENGINE

Q—What is the difference between a Continental engine C-2, which is in the GMC 41 2-ton truck and a Continental engine E-4, which is in a Republic truck 19 2-ton?

2—Are there different grades of Continental engines made?—A. B. Duke & Co., Chinook, Mont.

1—In the C-2 engine the cylinders are cast in a block and the cylinder sizes are  $4\frac{1}{8}$  in. bore and  $5\frac{1}{4}$  in. stroke; whereas in the E-4 the cylinders are cast in pairs and this engine has a bore of  $4\frac{1}{2}$  in. and a stroke of  $5\frac{1}{2}$  in.

2—There are different types and sizes, but the grade—meaning in this case, quality, is the same. This means the same methods of manufacture are employed, the same formulae are used and generally speaking the quality is the same all through, as near as human beings and modern machinery can make it. There is, of course, some variation, but this will apply to two engines of the same model as well as to two different models. There is, however, so little difference between any two engines of the same make as to be hardly noticeable.

## EXPANSION OF LYNITE PISTONS

Q—Explain just how the expansion takes place in a Lynite piston in a cylinder. For instance, using a  $2\frac{13}{16}$  piston, does the piston expand lengthwise and do the piston walls become thicker? In fitting piston pins will the pin become tighter in the hole, or does the hole expand, allowing the pin to become loose? We have heard some say that it fits piston pin in hole tight that it will become free when it gets hot.

2—Explain the direction of expansion around piston pin hole. Will it close or open more when getting hot?—Graulich Auto Sales Co., Evansville, Ind.

1—This is a three dimensional expansion. The piston becomes longer in its length. For every degree that the piston temperature increases, the piston length increases 0.0000142 in. per in. of length. If the piston pin is loose in the piston and fast to the rod then the pin will become looser in the piston pin boss as the temperature increases.

2—The hole for the piston pin becomes larger as the temperature increases. This expansion for aluminum is about two times as much as for iron.

## USING GAS FUEL FOR TRACTION ENGINE

Q—I have a 75 hp. C. L. Best traction engine used for farm work, using the ordinary gas engine distillate. Desire to use this same engine for belt work, using natural gas for fuel. What changes will be necessary?—J. P. Miller, Lemoore, Cal.

Two things will be required—to reduce the compression, in all probability, and to have a pressure regulator in the form of a gas bag. How much reduction in compression cannot be determined without knowing the amount of compression existing and the number of b.t.u. in the gas itself. If it does not run much over 700 to 1000 b.t.u. probably you can dispense with changing the compression unless the latter is very high. With gas

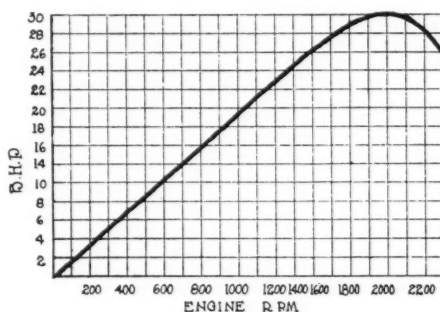


Fig. 6—Power curve of Briscoe four-cylinder engine

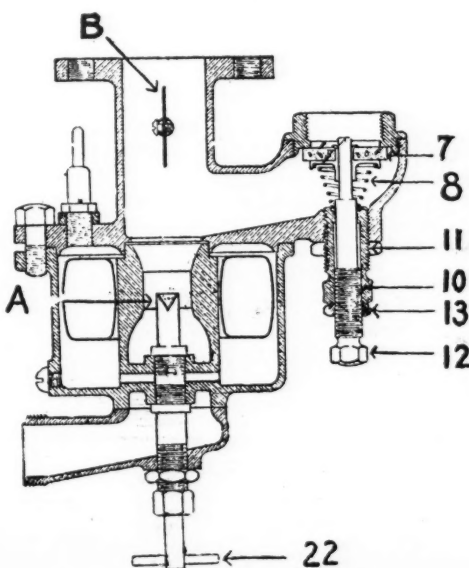


Fig. 7—Carburetor used on 1912 Cadillac

having high heat units and an engine with high compression it is likely the head of the cylinder would be blown off. It would be advisable to find somebody who is on the Pacific coast who has had experience along these lines with the kind of gas found and this will prove the most satisfactory way of determining the amount of compression that can be used.

## MEANING OF TORQUE

Q—Explain the meaning of the word torque when used in the expression "high torque motor" and then again as torque arm or rod. Does the latter expression have the same meaning as torsion arm and rod? George R. Jackson, New Boston, Ill.

As recently explained in these columns torque means rotary force; the smoother the application of power the better the torque, in other words. As to your second question, torque arm, rod, tube have the same meaning as torsion arm, rod or tube and each of these members performs exactly the same duty—that is, of preventing the axle from being twisted or tending to turn with the application of power through the bevel pinion engaging and turning the ring gear.

## ASKS FOR POWER CURVES

Q—Publish power curve of the Briscoe engine—F. H. Silvernale, Currie, Minn.

See Fig. 6.

## LAX INSPECTION HINTED

Q—Publish diagram showing correct piston position at opening and closing of inlet and exhaust parts on Willys-Knight car, model 84.

2—Have you record of any car of above model being sent out with the Eccentric shaft out of alignment, so as to put the sleeves out of time on two cylinders?—Overland Motor Sales Co., Mayfield, Ky.

1—To time a Willys-Knight engine the crankshaft should be turned over until

1-4

the mark — (exhaust closing No. 1

E-C

and No. 4 cylinder) as shown in Fig. 8.



on the flywheel rim, lines up with the mark (F) on the cylinder. With exhaust manifold removed, and a small electric light dropped down through spark plug hole, you should be able to detect a small streak of light appearing between upper edge of out sleeve exhaust port and lower edge of cylinder exhaust port.

2—We have heard of no trouble on the Willys-Knight that might be caused by lax inspection methods.

### HORSEPOWER OF BUICK

Q—What is the rated horsepower of the D-45 little Buick?—A Reader, Eufaula, Ala.

The D-45 Buick has a bore of  $3\frac{1}{4}$  in. and a stroke of  $4\frac{1}{2}$  in., so that under the N. A. C. C. rating it would be 25.35 h.p.

### INCREASING POWER ON FORD

Q—Instruct how to increase the power of a 1917 Ford engine about five or more horsepower.

2—Can you give any information concerning the 16 valve head engines manufactured by the Laurel Motors Corp., Anderson, Ind.? Has it been proven successful?—Geo. M. Good, Miami, Ariz.

1—There are numerous things that can be done to increase the power of any engine. By reaming out the valve seat about 1/16 in. you will increase the valve area close to 15 per cent. This will require the fitting of new valves, of course. The passageways for the gas should be smoothed wherever possible in order to permit unrestricted flow of the gases. You can add a next size larger carburetor and this will take care of the demand for more gas. If there is indication of piston slap, probably it will be necessary to regrind the cylinders and fit oversize pistons and rings; maybe this alone will give the desired results. You can go still further and change the form of ignition by installing

something like an Atwater Kent timer or a Bosch high tension magneto. Either of these can be installed with little work, as the concerns making them provide every part necessary. Few people realize how necessary is lubrication in adding power and an auxiliary oil tank, with a hand pump to throw into the crankcase a little extra oil now and then, particularly on a long, fast drive or hard pull, will add measurably to the power the engine will be able to deliver to the rear wheels. A careful tuning up of the entire car and engine, particular adjusting of all parts; cleanliness as to the engine, plugs, oil and grease; ample lubrication every place—all these little matters will each have a tendency to add to the possible amount of power. At the same time do not overlook the ignition and see that all wires are tight and in good shape.

2—Yes, and this will also add to the power. You will be able to increase

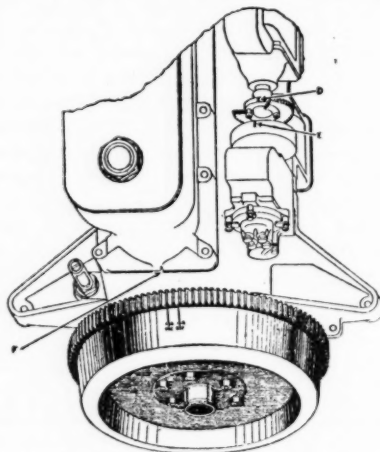


Fig. 8—Showing position of flywheel on Willys-Knight for proper sleeve setting

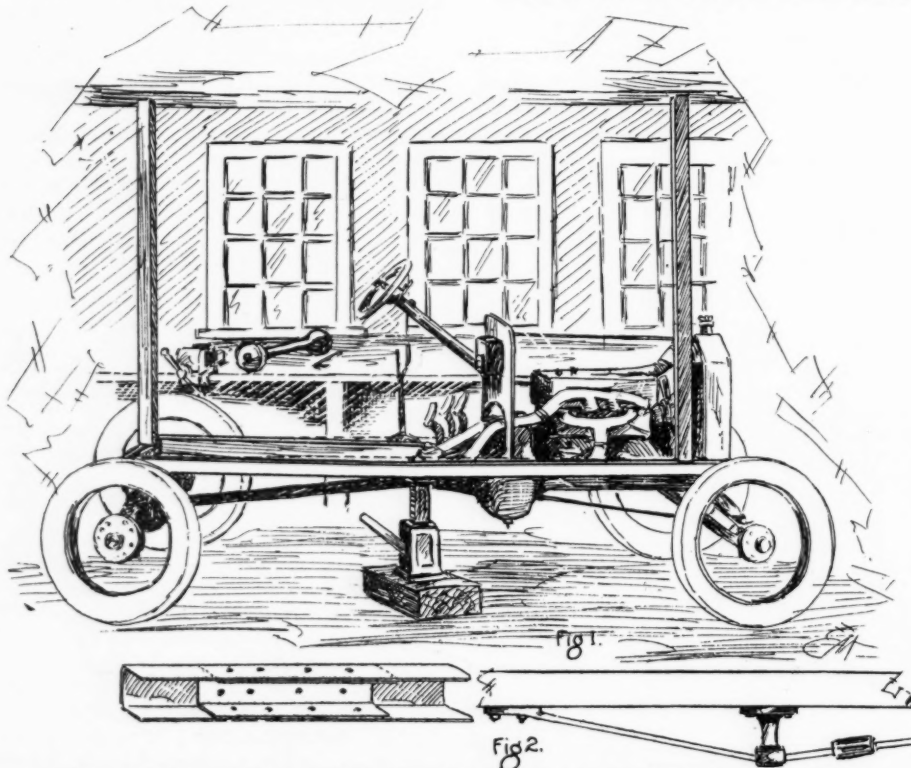


Fig. 9—Scheme for straightening Ford frame by using 2 by 4 members braced against the ceiling beam

the gear ratio and thus have more speed. At the same time the engine will not throttle down on low speeds quite so well.

### ASKS FOR BRAKE HORSEPOWER

Q—Give brake horsepower of the Chandler six-cylinder engine, 1919.

2—Publish power curve if available.

3—Publish size of intake and exhaust valves (throat measurements).

4—Give number of degrees the exhaust valve opens before lower dead center, and number of degrees the inlet valve closed after lower dead center.

5—Give size of intake and exhaust valves (throat measurements) of the Nash six-cylinder engine.—Harold Cockerline.

1—At 2925 r.p.m. the brake horsepower is 52; the N.A.C.C. formula gives the fig power as 29.4.

2—This is not available.

3—The valves are the same in size— $1\frac{1}{2}$  in. outside diameter and  $1\frac{1}{8}$  in. at the throat.

4—The exhaust closes 10 deg. late and opens 50 deg. early; the intake opens 15 deg. late and closes 40 deg. late.

5—The outside diameter of the Nash valve is  $1\frac{1}{2}$  in. and at the throat it is  $1\frac{1}{8}$  in.

### INSTALLING DODGE VALVES ON CHEVROLET

Q—Can enough material from the cylinder head of a Chevrolet model 490 car be removed to install Dodge valves? The valves fit in the guides perfectly. Would it be policy to cut valves down some? How much?

2—Would heavier valve springs have to be used?

3—Where can a high speed camshaft be obtained for this car?—Dr. G. B. Wiles, Sheboygan, Wis.

1—Yes, you can do this, but it is not advisable to try cutting down the valves; in other words, do not attempt to change the design, as you would be doing in this case.

2—Probably the old springs will do unless they show weakness beyond the original intention. This can be told best by trying for spring tension. If there is a popping back with the old springs then new springs will be needed.

3—D. R. Moonan, Paris, Ill., makes a business of manufacturing special camshafts and probably can supply your wants.

### UNEQUAL COMPRESSION

Q—A Buick car, model D-45 has been driven about 11,000 miles. When idling along at a speed of less than 15 m. p. h. the engine hits perfectly, but when the speed is increased to 15 miles or better the engine lopes. The loping continues even at high speed. The compression on four cylinders is 40 lb., on another 45 lb. and on the 6th 50 lb. The valves have been ground and are all O. K. The spark plugs have been renewed. The breaker points are in good contact and the contacts in the distributor head are bright and tight. The distributor driving post is snug and has no play. The carburetor has been adjusted from zero to maximum. The spark is being delivered to all six plugs. The push rods and rocker arms are in perfect condition. What then is the cause of the engine loping and what do you suggest would eliminate the trouble?—Alva Eidson, Grand Junction, Colorado.

In the first place you cannot expect a good running engine with such a variance in compression and it is suggested that the first thing to do will be to

equalize the compression. The difficulty may be caused by weak valve springs. Look also to the condition of the valve stems to see that one or more does not stick through, being bent or covered with carbon. It is generally necessary in a case like this to go over everything and through the process of elimination find the trouble. The term "loping" has a variety of meanings and does not mean much. Generally it is used when the mixture is too rich and the missing is caused by this. It would be a good plan to drive the car in and have some competent mechanic ride on the fender and open a relief cock, one at a time, to see how the engine is firing when at the higher speeds.

#### FOULING PLUGS

Q—A Ford car fouls the front plug sometimes in two or three miles and then again may run several hundred miles without fouling. The compression is about the same in all cylinders and ignition is all right. The engine does not use an excessive amount of oil, but 16 miles per gallon is the average mileage with all cylinders hitting properly. The engine carbonizes quickly, but the front plug is the only one that causes trouble. It is wet when removed. It seems that the float level is too high, but why should it affect the front cylinder more than the others?—Roscoe C. Morgan, Corydon, Iowa.

There is every probability the ignition in the front cylinder is not all right, despite your assertion to the contrary. It will be advisable to look to the timer, the wiring and the coil unit for the front cylinder, for the presence of moisture on the plug indicates there is incomplete combustion in this cylinder. At the same time see if there is not too much play in the valve stem guide, which if this is the case will permit too much air to enter the cylinder and thus rarify the charge.

If the car will travel only 16 m.p.g. you are using more fuel than is necessary and this, too, will account to a large degree for the excessive carbon that is found in the cylinders. We do not think the float level is to blame for any part of the trouble.

#### HIGH SPEED CRANKSHAFT FOR FORD

Q—Publish the address of a company who would manufacture a special high-speed crankshaft for a Ford. The crankshaft is to be hollow so the main bearings and rod bearings will oil through the crankshaft.

2—Will a 31 by 4 in. wheel with a 2 3/4 to 1 gear ratio, increase the speed of a Ford more than a 30-inch by 3 1/2 wheel would? Robert E. Clawson, Springfield, Ill.

1—Try the Green Engineering Co., Dayton, O., and D. R. Noonan, Paris, Ill., both concerns making a specialty of camshaft manufacture and perhaps can make crankshafts. Any good machine shop acquainted with motor car engines should be able to drill out a Ford crankshaft for the purpose you have in mind.

2—The sectional diameter of the tire will have nothing to do with it one way or another. You will make a slight gain in speed of the car with the same number of engine revolutions; in other words, you will improve the speed about 165 ft. to the mile.

#### BEST PISTON RING ON FORD

Q—What piston rings are best for use in a worked over Ford engine? W. Malcolm West, Craddock, Va.

There are a dozen or more makes of rings that can be used for such a job, but MOTOR AGE cannot make recommendations. Consult the advertising columns and write the makers for information and also suggest that they lay before you their various claims of superiority.

### Rebuilding

#### STRAIGHTENING FORD FRAME

Q—The frame on a Ford coupe is sprung at the point where the rear engine supports rest. How can this be straightened?—Ray Frates, Brule, Neb.

Straightening the frame may take away the tendency to drag; otherwise look to the condition of the transmission bands and see if they do not need either renewal or adjustment. Look particularly at the brake band.

#### REBUILDING A FORD

Q—Desire to remodel a 1913 Ford body so that it will resemble a Velie. Also remodel a 1916 Radiator, or a 1919 Radiator, or must it be built to order, if so what would it cost? If I could make it, give instructions and sketches with size of radiator.

2—What about the hood?

3—Give instructions for making and painting; also the dash. Desire to lower the cushion in front and rear seat.

4—Which is preferable to have, the gasoline tank in dash or on rear of body with vacuum feed? Desire it in the dash if it would give satisfaction.

5—What about the wind-shield, top, rear seat, back and sides of front seat?—Hubert Smith, Memphis, Mo.

1—Probably it will not be necessary to have a complete new radiator, but you will require a new shell if you desire to rebuild your car into a streamline one, with sloping hood. This should be about the last thing to be done; that is, you should have the body finished and the shape of the cowl determined to have a radiator shell made to give the correct angle to it. After you have built on the cowl take careful measurements and make an outline drawing and send that to any of the concerns making special Ford radiators, as advertised in MOTOR AGE, and you can procure figures on the cost of making the shell.

2—This will also apply to the hood, although a good tinsmith ought to be able to work out this article, having the car to fit it to and the old hood to obtain the general dimensions.

3—This is a pretty big undertaking

in a limited space. It means a big job and we are of the opinion you will be better pleased, and perhaps money in pocket, to buy one of the many special bodies made to fit a Ford car. You will have to have a groundwork of strong sills, to which you attach the uprights, bent to the shape desired. These, in turn, are braced with laterals and all glued and held together with corner braces. You can follow the general style of building from the old Ford body, changing the design to meet your own requirements. Perhaps you may be able to use the Ford doors and if so it will save a lot of work. Light weight sheet iron can be used to cover the body, bending to fit and anchoring with countersunk wood screws, soldering the seams and smoothing off. All this applies to the cowl as well as to the body of the car. You should rub down the metal and wood work with sandpaper to remove any roughness or rust; then apply a ground coat of lead and rub that down with pumice and water. Another coating of lead, after puttying the small cracks and holes, should be applied and rubbed down. The body will be ready for the first color coat of flat. This, too, should be rubbed down, and then comes the color varnish, the rubbing varnish and the finishing varnish after the rubbing varnish has been rubbed down. The fenders, brackets, hood, radiator and such parts can be finished with a coat or two of air-drying enamel mixed with about one-third finishing varnish to give it electricity and tenacity.

The cushions can be lowered simply by making the supporting framework as low and at the pitch to suit your tastes.

4—It will require less pipe fitting to have the tank in the cowl. This will give better results and afford fewer complications once installed. Besides, it will be cheaper by a good deal.

5—The windshield can be bolted to the frames by running the ends through the metal and locking with heavy nuts underneath. While you are at it you may as well give the windshield a slant and make it somewhat modern. We do not believe you will be able to rebuild either the top or do the upholstering, as these things are difficult work and require the services of an expert.

#### A MERCER SPEEDSTER

Q—Publish Mercer with speedster or racing body on it.—J. J. Foster, Springfield, Ill.

This is shown in Fig. 10.

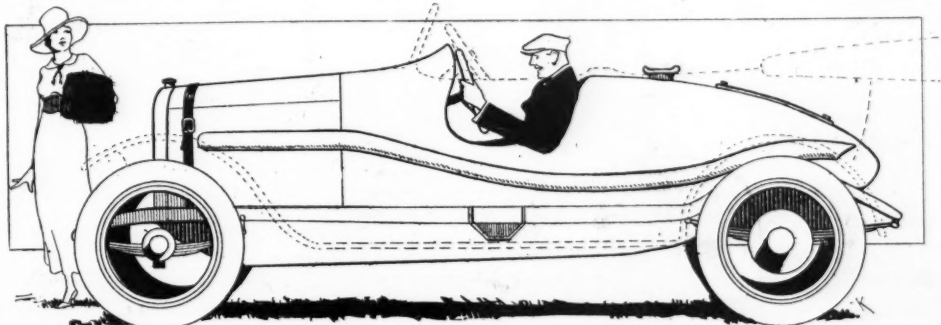


Fig. 10—Racing car body design for Mercer



# The Accessory Corner

## New Fitments for the Car

### Perfection Heater

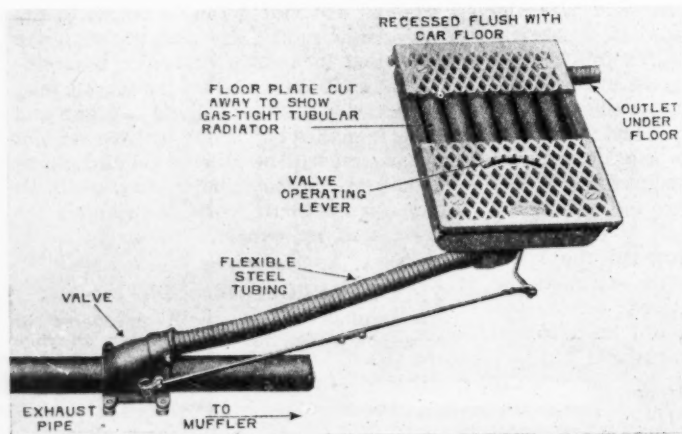
Now that the cold weather is here a supply of comfort giving accessories will bring many satisfied customers to the dealer. The Perfection heater shown in the illustration is installed in the tonneau, its heat is derived from a special outlet from the exhaust pipe controlled by a valve that by-passes the hot gases through the tubes of the heater from where they are emitted through a special outlet. This heater is made by the Perfection Heater & Mfg. Co., Cleveland, Ohio.



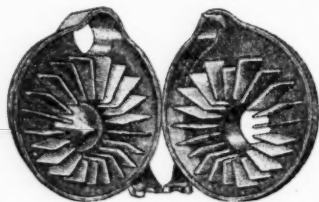
Sun Ray lens

### J-K Lever Pump

The J-K Lever Pump is a single acting pump, the plunger of which is controlled by a compound lever. The pump is made by the Jensen-Kohler Mfg. Co. (Inc.), St. Charles, Ill.



Perfection heater



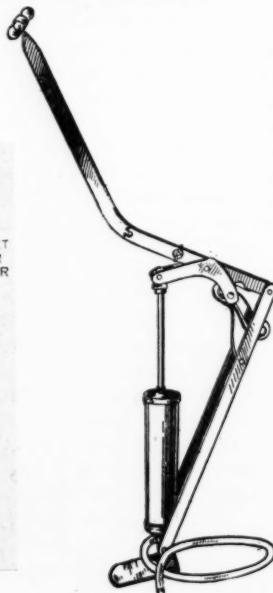
"Vacuum Muffler"

### Sun-Ray Lens

The Sun-Ray lens is of patented design, the construction furnishing a number of small prisms that direct the light on the road and sufficiently subdued to prevent glare and at the same time diffuse to spread the light over the road. One of the attractive features of this lens is \$1.75 per set. This lens is made by the Prismolite Company, Columbus, Ohio.

### Engine Heater

One of the latest additions to the accessory list of the Westinghouse Electric & Mfg. Co., Pittsburgh, Pa., is an engine heater that keeps the engine warm when the car is in the garage over night. The heater is attached to an electric light cord and the conception is such that the cost is less than one cent per hour.



J-L lever pump

### "Vacuum Muffler" for Fords

This is a special muffler for the Ford car for replacement of the old muffler. It is composed of two castings having fins in their interior that when brought together intermesh, and so cause the gases to travel in and among these cooling fins and at the same time the gases are giving a rotary motion before passing out through the exhaust pipe. The muffler is made by the Vacuum Muffler Corp. of America, 154 Nassau Street, New York.

### Spindle for Ford Front Wheels

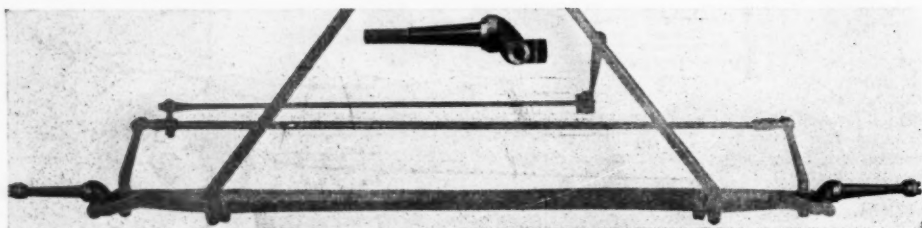
Shown in the illustration is a new spindle for the front wheels of the Ford car, which are designed to overcome the objections of the Ford steering system. It is claimed that the offset construction of the spindle reduces the shock transmitted to the steering wheel. Also, the offset construction is said to permit of turning in a shorter radius. The device is made by the Motor Spindle Corp., 214 E. Jefferson Ave., Detroit.

### ARG Auxiliary Spring

Here is a new shock absorber for the Ford that is very easily installed and that is designed to counteract the action of the short transverse Ford spring. The shock absorber is of the coil spring type and it is inserted between the axle and the front cross member support directly under the radiator. It is made by the Auxiliary Spring Co., Inc., Birmingham, Ala.



Westinghouse engine heater



Spindle for Ford front wheels

# Service Equipment

## Time Savers of the Shop

### Combination Vise

Here is a combination vise that performs many varied duties. It combines the drill press vise, V blocks and angle plate. It enables the operator to hold a round piece of stock in a vertical position for drilling holes in the end of the bar. It provides for holding the rod or bar at an angle, while drilling a hole at the other than right angles, an operation that generally results in a broken drill unless the stock is held securely. The vise is made by the Germanow-Simons Machine Works, Rochester, N. Y. Two sizes are provided that, one that has a jaw opening of 5 in. and the other a jaw opening of 7 in., selling respectively for \$35 and \$50.

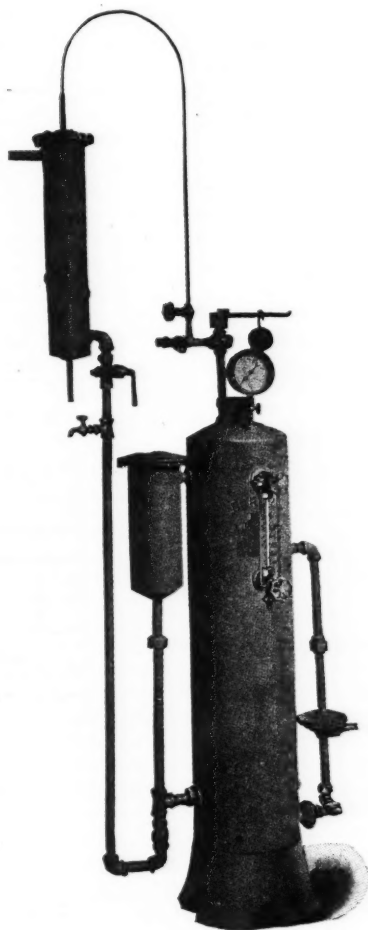
### Slip-In-Apron

The Slip-In-Apron, made by Beardsley & Haft Co., Columbus, Ohio, serves a very useful purpose for the garage man.

Particularly is this true for the battery department where acids are handled. Several different styles of aprons are made. A heavy duck apron for protection when working on the mechanical units and an acid proof rubberized fabric for use in the battery room.

### Battery Connector Drill

Herewith is shown a drill particularly designed to do away with the great trouble experience by the battery man in burning the straps and terminals on to the posts after having been drilled off with a common drill. This drill is made in two sizes,  $\frac{3}{4}$  and  $\frac{1}{2}$  in. and consists of the cutting part which screws into

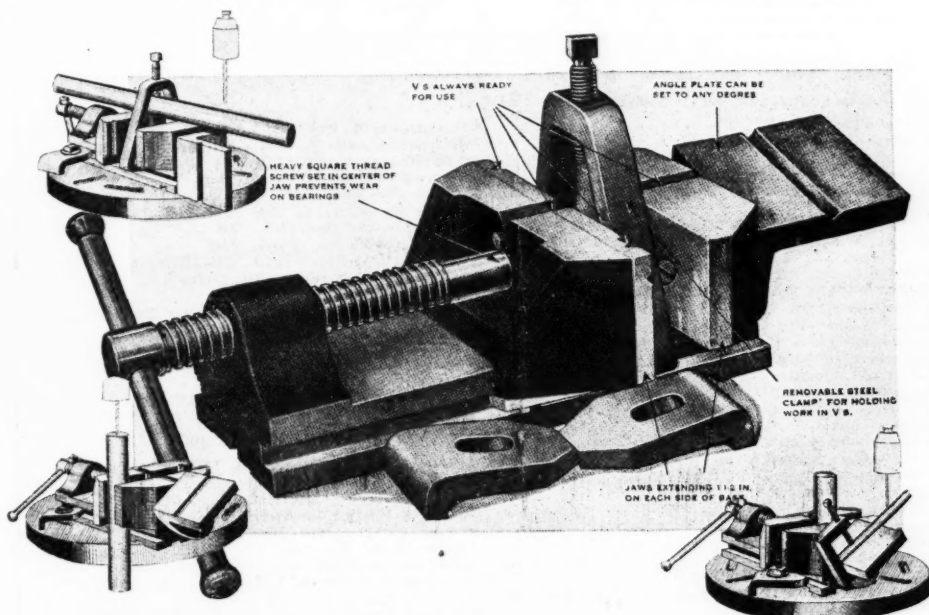


the shank part made either round or square and a centering device made from a plunger and a spring. The sharp edge of the plunger is pressed into lead as weight is put on the drill and holds it in place while drilling. The spring allows the plunger to be pushed up into the drill by the post which is formed in the center while drilling. The size of the post that is left after the strap is drilled off is  $\frac{3}{8}$  in. in diameter at the top and  $\frac{1}{8}$  in. at the bottom. Thus a clean cut post is left which forms the foundation for burning on the connector. The device is made by the Electric Shop, Centerville, S. D.

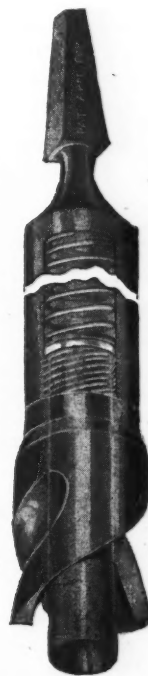
### Steam Generator and Water Still

Distilled water in a battery service station is as necessary as sugar in a grocery store. The quantity of water needed depends of course on the size of the station and if a large quantity is needed, equipment such as is made by the P. M. Lattner Mfg. Co., Cedar Rapids, Iowa, and which is illustrated herewith proves to be very economical. This outfit furnishes steam for softening the wax in the battery so the unit may be lifted in a moment's time and the customer shown the condition of his battery while he waits. In addition to furnishing steam the outfit makes distilled water. Everything on this machine is automatically controlled.

Steam generator and water still which makes steam for softening battery wax and furnishes distilled water



A vise that combines the drill press vise, V blocks and angle plate



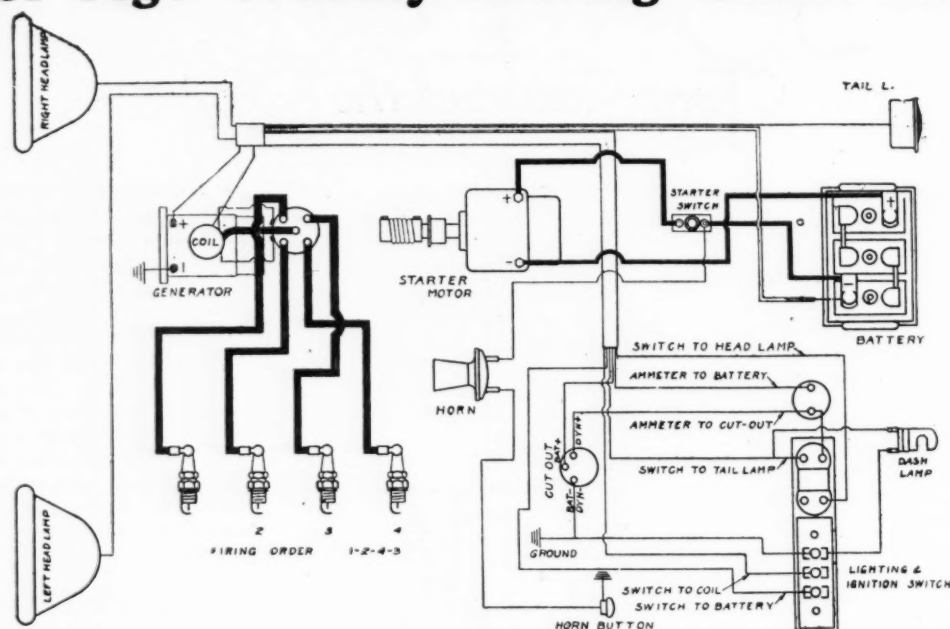
Battery connector drill



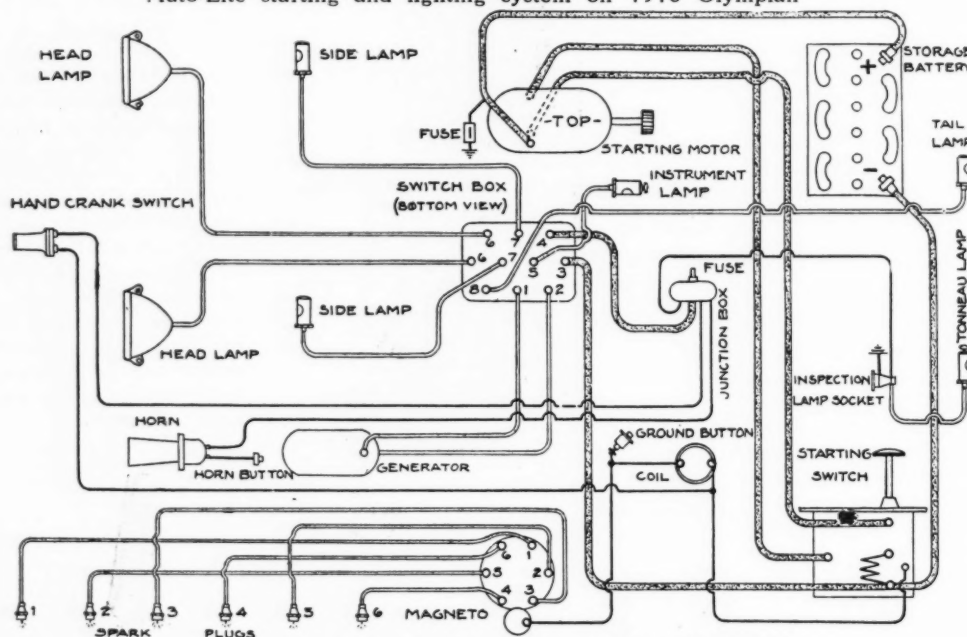
Slip-in apron



# Motor Age Weekly Wiring Chart No. 61



Auto-Lite starting and lighting system on 1918 Olympian



Bosch Rushmore system on Marmon 41—1914-'15-'16

## THIS WEEK 1914-'15-'16 Marmon 1918 Olympian

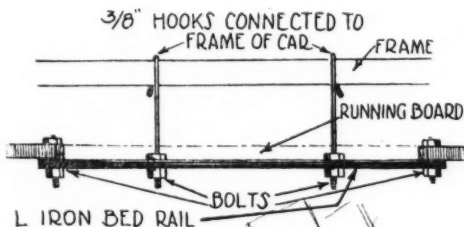
Abbott—March 20-27, '19  
Alco—April 24, '19  
Allen—Dec. 18, '19  
Alter—Nov. 14, '18  
Apperson—March 6, '19  
Auburn—Nov. 27, '19  
Briscoe—Oct. 16, '19  
Buick—Nov. 21, '18; April 3, '19; Oct. 23, '19  
Cadillac—Dec. 10, '18  
Carte—May 1, '19  
Case—Feb. 27, '19; Oct. 2, '19  
Chalmers—Feb. 20, '19; March 27, '19; Nov. 27, '19  
Chandler—April 3, '19  
Chevrolet—Nov. 28, '18; March 27, '19  
Cole—Jan. 23, '19; April 3, '19  
Crow-Elkhart—June 26, '19  
Cutting—Nov. 6, '19  
Daniels—Dec. 4, '19  
Davis—May 8, '19; Dec. 4, '19  
Detrolter—March 6, '19  
Dodge—Dec. 12, '18  
Dorris—Dec. 11, '19

Dort—March 13, '19  
Elgin—Feb. 27, '19  
Empire—March 13, '19; Oct. 30, '19  
Essex—Oct. 23, '19  
Ford—Jan. 30, '19; Feb. 6, '19; May 15, '19  
Franklin—June 19, '19; Dec. 11, '19  
General Battery Charging—May 20, '19; Sept. 25, '19  
General Magneto Diagram—June 5, '19  
Grant—Feb. 27, '19; March 27, '19  
Haynes—Sept. 4, '19; Oct. 9, '19  
Henderson—April 3, '19  
Hudson—Dec. 5, '18; May 1, '19  
Hupmobile—Feb. 13, '19; Oct. 16, '19  
Internal Connections—July 10-17-24, '19  
Interstate—March 13, '19  
Keeton—Nov. 6, '19  
King—July 3, '19  
Kissel—July 3, '19  
Krit—Feb. 6, '19  
Lexington—April 24, '19; Jan. 1, '20  
Liberty—Jan. 1, '20  
Little—March 20, '19  
Locomobile—Jan. 23, '19; April 17, '19  
Marmon—Jan. 9, '19; Dec. 25, '19  
Maxwell—Jan. 16, '19; Aug. 14, '19  
Marion—March 6-20, '19  
Mercer—Jan. 23, '19; Aug. 28, '19; Nov. 27, '19

Michigan—March 20, '19  
Mitchell—Jan. 9, '19; Jan. 8, '20  
Monroe—Oct. 30, '19  
Murray—May 1, '19  
National—June 19, '19  
Oakland—Jan. 2, '19; Oct. 16, '19  
Oldsmobile—Jan. 23, '19  
Overland—Nov. 7-14, '18  
Owen-Magnetic—Sept. 18, '19  
Packard—June 19, '19; July 31, '19  
Paige—July 3, '19  
Paterson—March 20, '19; June 26, '19; July 9, '19  
Pierce-Arrow—Oct. 2, '19  
Premier—April 10, '19; Dec. 18, '19  
Pullman—April 10, '19  
Regal—Feb. 6, '19; April 10, '19  
Reo—Feb. 27, '19; Aug. 21, '19; Oct. 9, '19; Nov. 13, '19  
Saxon—April 17, '19  
Scripps-Booth—Dec. 26, '18; Jan. 15, '20  
Simplex—April 17, '19  
Stanley—June 26, '19  
Stearns-Knight—April 24, '19; Jan. 8, '20  
Studebaker—Dec. 26, '18; Dec. 25, '19  
Stutz—Jan. 23, '19  
Velle—April 24, '19; Sept. 25, '19  
Westcott—May 8, '19; Jan. 15, '20  
White—Sept. 25, '19  
Special Systems for Fords—May 15-22, '19

# The Motor Car Repair Shop

## Practical Maintenance Hints



A substantial running board brace for Fords

### Air Pressure Grease Gun

A simple grease gun which will come in handy about the garage is shown in the drawing. It consists of a length of gas pipe, three inches in diameter and ten inches long. A handle may be attached to the side by cutting a length

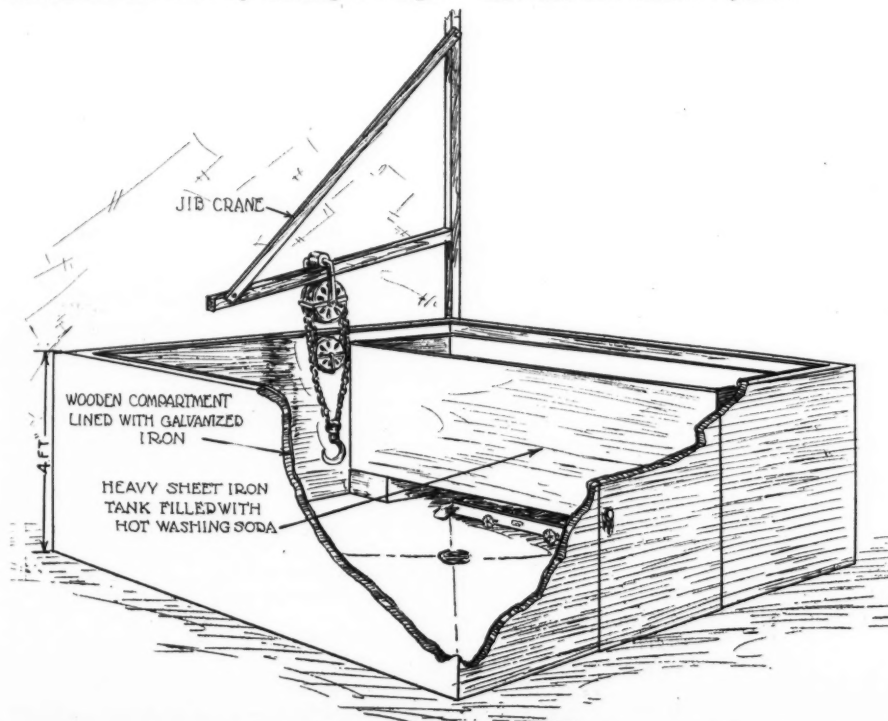
of scrap iron and riveting it on. Thread each end of the pipe and provide caps to screw on, and bore one for a hole large enough to take a tire valve. This may be either soldered or screwed in. Procure a long oil can spout and drill a hole in the other cap large enough to take it and also solder.

The rear cap is removed and the pipe filled or nearly filled with grease and the cap replaced. The air is then applied to the valve after the spout has been inserted in the hole or opening of the box to be filled with grease and the pressure applied until sufficient grease has been forced out. This gun, with any garage air supply, will deliver any kind of grease from oil to hard oil and the heavy greases, and will be a great convenience as it saves time and puts the lubricant where it is wanted and in the right quantity.

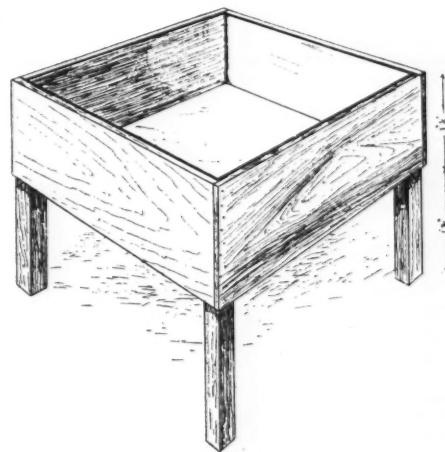
### Radiator Testing Box Construction

It is easy enough to construct a watertight box which will serve as a vat for testing leaking radiators. At the same time it is helpful to know what other service stations have found practical in this line. The tank illustrated is to be found in a large truck service station in New York City and is designed to hold the largest truck radiators.

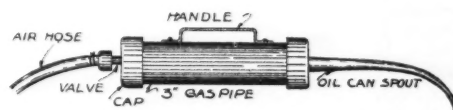
The tank is four feet square and 1 1/4 ft. deep and rests on four husky legs which are 1 1/4 ft. long. The tank is lined with zinc and has soldered joints.



Apparatus designed to facilitate washing parts and jib crane for handling large units



Radiator testing box



Air pressure grease gun

### Washing Apparatus

One of the largest truck service stations in New York City washes all units requiring repairs in hot washing soda and the apparatus employed is interesting because it is somewhat different.

The difference lies mainly in the fact that instead of having the washing tank or vat right out on the shop floor it is confined in a compartment built for the purpose. This compartment is about 8 ft. square and 4 ft. high, is built of wood and lined with galvanized iron soldered at the joints. There is a door at the front. A drain in the center of the enclosure carries off splashed water.

The washing tank or vat is made of heavy sheet iron and rests in one end of the compartment. Heat is supplied by gas burners underneath.

A jib crane is located in one corner and on its swinging arm rolls a chain block and tackle. This equipment makes it easy to handle large units. Obviously the use of this compartment makes for cleanliness in that it confines the dirt within the four walls of the compartment.

### For Simple Ford Repairs

Castendyke Hame Co., of LaSalle, repair a great many Fords. They suggest an inexpensive and unique way of putting a brace on the running boards of a Ford. An old iron bed rail, two braces and a couple of old bolts are all that are necessary. Each end of the rail is bolted to the running board immediately back of the front fender. Longhooks are connected from the center of the rail to the frame of the car. This attachment makes the running boards very substantial.



# Tire and Rim Sizes

## Motor Age Maintenance Data Sheet No. 75

One of a series of weekly pages of information valuable to service men and dealer—Save this page

### 1918 Cars (Continued)

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Campbell.....		30x3½		Demountable.....	
Case, U-50.....	Goodyear	35x4½		Demountable.....	Stanweld
Chalmers, 6-30.....		32x4	S. S.	Demountable.....	Kelsey
		34x4			
Chandler.....	Goodrich	34x4	Plain & Non-Skid	S. S.	Firestone
	Goodyear				
Chevrolet, FA-2.....		33x4		Demountable.....	
Chevrolet, 490.....		30x3½	Clincher	Demountable.....	
Cole, 870.....		33x5	S. S.	Demountable.....	
Columbia, C. & D.....		32x4		Demountable.....	
Comet, C-51.....	Goodyear	33x4	S. S.	Dem. S. S.	Firestone
Commonwealth, 4-40.....		32x3½			
Crawford, 6-40.....		32x4		Q. D.	Firestone
Crow-Elkhart, K-32, 34 & 36.....	Firestone	32x3½		S. S.	Fisk & Firestone
					Firestone
Cunningham, V-3.....	Opt	35x5	S. S.		Firestone
Daniels, A. & B.....	Goodyear	34x4½	Cord	S. S.	Firestone
Davis, J.....		34x4½		Q. D. D.	Firestone
Davis, H.....		34x4	S. S.	E.	Firestone
Disbrow.....		33x4½			
Dispatch.....		36x3½		Q. D.	Universal
Dixie Flyer, LS-35.....	Goodrich	32x3½	S. S.		Firestone
Doble.....	Goodrich Cord	33x5			
Dodge Brothers.....	Goodrich	32x3½	S. S.	S. S.	Kelsey
	Firestone				
Dodge Brothers.....	U. S.	33x4	S. S.	S. S.	Dodge Brothers
	Republic				Stanweld
	Goodrich Cord	33x5			Firestone
Dorris, 6-80.....	Goodyear	35x5	S. S.	Q. D. D.	
	Firestone				
Dort, 8 & 11.....	Goodyear	30x3½	Clincher	Demountable.....	Perlman
Douglas.....	Firestone	34x4	S. S.	Demountable.....	Firestone
Elcar, D-4.....	Firestone	32x3½	S. S.	No. 21	Stanweld
Elcar, D-6.....	Firestone	33x4	S. S.	No. 21	Stanweld
Elgin, F.....	Firestone	33x4		S. S.	Firestone
	U. S.				
Empire.....		33x4		S. S.	Stanweld
					Firestone
Ford, T.....		30x3½	Clincher	Clincher	Ford
Franklin, Series 9.....	Goodyear	33x4½	S. S.	No rim cut, Det.	Goodyear
F. R. P. #.....	Goodrich Cord	36x5			
Geronimo.....	Goodyear	32x4	S. S.		
Geronimo, A-45.....		32x4			
Ghent, 6-60.....	Firestone	34x4½		S. S.	Firestone
Glide, 6-40.....	Goodyear	34x4	S. S.	Demountable.....	Goodyear
Grant.....		32x3½	S. S.	Demountable.....	Firestone
Hackett, AL.....		32x3½	S. S.	Demountable.....	Firestone
Hal.....	Silvertown Cord	34x4½		S. S.	Stanweld
Harroun.....		30x3½		Q. D.	Firestone
Harvard, 4-20.....		28x3		Demountable.....	
	Firestone			Light E.	Firestone
Haynes, 38 & 39.....	U. S.	34x4	S. S.	No hook-Wire Wheel	Goodyear
	Goodyear			Light E.	Firestone
	Firestone			No hook-Wire Wheel	Goodyear
Haynes, 43 & 44.....	U. S.	34x4½	S. S.	Demountable.....	
	Goodyear			S. S.	Firestone
Hollier, 196.....		32x3½	S. S.	Demountable.....	
Hollier, 206.....		32x4		S. S.	Firestone
Hollier, 188.....		34x4	S. S.	Demountable.....	
Holmes.....	Goodyear Cord	34x4½		Q. D.	Goodyear
Homer Laughlin, D.....		30x3½			
Hudson, M.....		32x4½		S. S. & Clincher	Kelsey
		35x4½			
Hupmobile, R.....	Goodyear	32x4	S. S.	Demountable.....	Firestone
Inter-State, T.....	Goodyear	33x4		Demountable.....	Firestone
Jackson.....		37x4			
Jones, 27.....	Goodrich	34x4	S. S.	S. S.	Firestone
Jordan, C.....	Firestone	32x4	S. S.	Type E.	Firestone
King, EE & F.....	Goodyear	34x4	Non-Skid	Demountable.....	Stanweld
	Firestone				

#### ABBREVIATIONS:

S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.

# Tire and Rim Sizes

## Motor Age Maintenance Data Sheet No. 76

One of a series of weekly pages of information valuable to service men and dealer—Save this page

### 1918 Cars (Continued)

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Kissel Kar, 100 Pt.	Goodyear	34x4			Firestone
Kissel Kar, 6-42	Firestone				
Klinekar, 6-38 & G. & G. A.	Goodyear Cord	34x4½		Demountable	Firestone
Lexington, 6-R	Goodyear	34x4	S. S.	E light	Firestone
Liberty, 10-B	Goodyear	34x4	S. S.	Demountable	Goodrich
Locomobile, R. and M.	Opt.	34x4	S. S.	Demountable	Firestone
Madison	Goodyear	35x5	34x4½	Q. D. D.	Firestone
Maibohm, B.		34x4		S. S.	Firestone
Marion-Handley, A.	Opt.	32x3½	S. S.	Demountable	Stanweld
Marion-Handley, B.		34x4	S. S.	Demountable	Firestone
Marmon, 34	Goodrich	35x4½	S. S.	Demountable	Firestone
		32x4½	Front C ribbed.	S. S.	Stanweld
			Rear C Non-skid		
Maxwell, 25		30x3½	Clincher	Demountable	
McFarlan, X		35x5		Q. D. C.	Firestone
Mercer, Series 4		32x4		S. S.	Howard & Stanweld
Mercer, Series 4		32x4½		S. S.	Howard & Stanweld
Metz, 25	Goodrich	32x3½	S. S.	Demountable	Firestone
Mitchell, C-42		34x4	S. S.	No. 21	Stanweld
Mitchell, D-40		32x4	S. S.	No. 21	Stanweld
Moline-Knight, L	Goodrich	34x4	S. S.	Demountable	Firestone
	Firestone				
Monitor, C	U. S.	32x3½	S. S.	Demountable	Goodrich
Monitor, M	U. S.	33x4	S. S.	Demountable	Goodrich
Monroe, M-3		30x3		Q. D. C.	Jackson
		31x3½			
Monroe, M-6		32x3½	S. S.	Demountable	Firestone
Moon, 6-36	Miller	32x3½	Geared to Road	S. S.	Firestone
Moon, 6-66	Miller	35x4½	Geared to Road	S. S.	Firestone
Moore, C	Firestone	30x3½	Front—Diamond	Clincher	Perlman
			Rear—Plain		
Murray		34x4½		S. S.	Firestone
Nash, 681-685	Firestone	34x4		S. S. Dem.	Firestone
National, A. F. & A. K.	Opt.	34x4½	S. S.	S. S.	Firestone
Nelson, C	Goodyear	32x4	S. S.	S. S. Dem.	Kelsey
Napoleon, 18-35		32x4		Demountable	
Nepoleon, 18-39		34x4		Demountable	Firestone
Oakland, 34-4	Goodyear	32x4	S. S.	S. S.	Perlman
Oldsmobile, 37		32x4	S. S.	Demountable	Perlman
Oldsmobile, 45-A		34x4		25	Perlman
Olympian		32x3½		S. S.	Perlman
Overland, 85-4 & 85-B-4, 85-6 & 85-B-6		32x4		No. 21 Dem. S. S.	Stanweld
Overland, 85-4 & 85-6		33x4½		No. 21 Dem. S. S.	Stanweld
Overland, 90 & 90-B		31x4		No. 23 Solid Dem.	
				Clincher	Stanweld
Owen Magneto	Goodrich	35x5	S. S.		Firestone
	Goodyear				
Packard, 325 & 335	Goodyear	34x4½	Clincher	Q. D. D.	Firestone
Paige, 6-55		35x5	S. S.	S. S.	
		33x4½			
Paterson, 6-45		32x4		S. S.	Perlman
Peerless, 56		35x4½		S. S.	Firestone
Pennsy		32x3½		S. S.	Goodyear
Pennsy		33x4		S. S.	Goodyear
Fhianna, M	U. S. Royal Cord	32x4½	S. S.	Q. Dem. S. S.	Firestone
Pierce-Arrow, C-4		34x4½		Q. D. C.	Goodyear
Pierce-Arrow, 48		35x5		S. S. Q. D.	Goodyear
Pierce-Arrow, 66		36x5½		Q. D. C.	Goodyear
Pilot, 6-45	Miller	32x4		Dem. S. S.	Parker
Premier, 6-C	Opt.	32x4½	Opt.	S. S.	Firestone
Princess		32x3½		S. S.	Firestone
Regal, J		30x3½		S. S.	Firestone
Reo, T. & U.	U. S.	34x4	S. S.	Demountable	Firestone
Roamer, D-75 & C-54	Goodyear Cord	32x4½			
Roamer, D-75	Goodyear Cord	34x4	Front—Ribbed	S. S.	Stanweld
Roamer, C-54	Goodyear Cord	32x4	Rear—A. W. T.		
Saxon, B-5		30x3		Clincher	Prudden

#### ABBREVIATIONS:

S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.



# Motor Age Monthly Guide to Tractors

Tractor specifications appear the last issue of each month

Line No.	Manufacturer	Tractor and Model	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
1	Advance-Rumely Thresher Co. Laporte Ind.	Oil Pull	12	20	3	22 x 36	2150	6682		Wh.	51	Own	2 Hor.	6 x 8	560
2		Oil Pull	16	30	4	28 x 44	2850	9600		Wh.	56	Own	2 Hor.	7 x 8½	530
3		Oil Pull	20	40	5-6	32 x 52	3750	12820		Wh.	64	Own	2 Hor.	8 x 10	450
4		Oil Pull	30	60	8-10	36 x 60	5900	26700		Wh.	80	Own	2 Hor.	10 x 12	375
5	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	Allis-Chalmers, 18-30	18	30	3-4		3000	6000	\$1,785	Wh.	50	Own	4 Ver.	4¼ x 6½	830
6	Appleton Mfg. Co., Batavia, Ill.	Appleton	12	20	2-3	22	2000	4900	1,650	Wh.	54	Buda	4 Ver.	4¼ x 5¼	1009
7	Aultman-Taylor Machinery Co., Mansfield, O.	Aultman-Taylor	15	30	4	28	2800	7500	2,300	Wh.	70	Clim.	4 Ver.	5 x 6½	900
8		Aultman-Taylor	22	45	6	32	4800	13000	3,700	Wh.	70	Wauk.	4 Ver.	4¼ x 6¼	
9		Aultman-Taylor	30	60	8-12		8000	23000	4,800	Wh.	90	Own	4 Hor.	5½ x 8	600
10		Aultman-Taylor	30	60	8-12		8000	23000	4,800	Wh.	90	Own	4 Hor.	7 x 9	500
11	Automotive Corp., Toledo, Ohio	Automotive, B-B	12	25	2	30	1800			Wh.	40	Herc.	4 Ver.	4 x 5½	1000
12	Avery Co., Peoria, Ill.	Avery, 8-16	8	16	2-3	22 x 32	1800	4900		Wh.	50	Own	2 Hor.	5½ x 6	600-700
13		Avery, 12-25	12	25	3-4	20 x 30	2800	7500		Wh.	56	Own	2 Hor.	6½ x 7	600-700
14		Avery, 14-28	14	28	3-4	24 x 36	3000	6800		Wh.	60	Own	4 Hor.	4½ x 7	00-800
15		Avery, 18-36	18	36	4-5	24 x 36	3500	9250		Wh.	65	Own	4 Hor.	5½ x 6	650-750
16		Avery, 25-50	25	50	5-6	28 x 46	4800	12500		Wh.	69	Own	4 Hor.	6½ x 7	600-700
17		Avery, 40-80	40	80	8-10	32 x 54	7600	22000		Wh.	87½	Own	4 Hor.	7¾ x 8	500-600
18	Bates Mach. & Trac. Co., Joliet, Ill.	Steel Mule	15	22	3	28-30		4000	1,985	Cr.		Erd	4 Ver.	4 x 6	900
19	C. L. Best Gas Trac. Co., San Leandro, Calif.	Tracklayer, B	12	25	3		2000	5100	2,600	Cr.		Own	4 Ver.	4½ x 5¼	850
20		Tracklayer, A	35	60	9		6500	17500	5,750	Cr.		Own	4 Ver.	6½ x 3½	650
21	Buckeye Mfg. Co., Anderson, Ind.	Trundaar, 10	25	40	4		3750	8800	3,750	Ch. T.		Wauk.	4 Ver.	5 x 6¼	900
22	Bull Tractor Co., Anderson, Ind.	Bull	12	24	2-3	26	1000	4996	1,200		60	Toro	2 Hor.	5½ x 7	750
23	Burn-Oil Tractor Co., Peoria Ill.	Burn-Oil, A	15	30	3	26		5500	1,550		56	Own	2 Hor.	6¾ x 7	700
24	J. I. Case Plow Works Co., Racine, Wis.	Wallis, K	15	25	3		2000	3560		Wh.	48	Own	4 Ver.	4¼ x 5¾	850
25		Case, 10-18	10	18	2	20 x 28	1665	3400	1,200	Wh.	42	Own	4 Ver.	3¾ x 5	1050
26		Case, 15-27	15	27	3	20 x 36	2500	5750	1,600	Wh.	52	Own	4 Ver.	4½ x 6	900
27		Case, 22-40	22	40	4-6	26 x 46	3428	9500	2,600	Wh.	56	Own	4 Ver.	5½ x 6¾	850
28	Cleveland Trac. Co., Cleveland, Ohio	Cletrac, H	12	20	2	24-40	1285	3300	1,585	Cr.		Own	4 Ver.	3¾ x 5½	1285
29	Dart Truck & Trac Corp., Waterloo, Ia.	Blue J, T. E	12	25	3	24	2250	4300	1,850	Wh.	42	Buda	4 Ver.	4¼ x 5½	1050
30		Blue J	15	30	3-4	28	2500	4500	2,000	Wh.	42	Buda	4 Ver.	4½ x 6	1050
31		Sa d sky J	10	20	3	22	2000	4080	1,650	Wh.	48	Own	4 Ver.	4¼ x 5¼	1050
32	Dauch Mfg. Co., Sandusky, Ohio	Sandusky, E	15	35	4	30	3500	7670	2,500	Wh.	56	Own	4 Ver.	5 x 6½	750
33		Leader B	12	24	2	20	2000	5200	1,285		48	Own	2 Hor.	6¼ x 6	800
34		Leader, C	18	36	3-4	28	4000	6500	2,495	Cr.		Twin	4 Ver.	5 x 7½	750
35	Dayton-Dowd Co., Quincy, Ill.	Leader, CX	20	40	4-5	28	5000	6500	2,750	Cr.		Doman	4 Ver.	6 x 7	750
36		Eagle, F	12	22	2-3	24	2400	5850	1,290	Wh.	48	Own	2 Hor.	7 x 8	450
37	Eagle Mfg. Co., Appleton, Wis.	Eagle, F	16	30	3-4	28-30	3200	7100	1,750	Wh.	52	Own	2 Hor.	8 x 8	450
38		Allwork, C	14	28	3	28	3000	5000		Wh.	48	Own	4 Ver.	5 x 6	800
39	Electric Wheel Co., Quincy, Ill.	E B, Q	12	20	3	24	2000	6500		Wh.	60	Own	4 Ver.	4¾ x 5	850
40		E-B, 12-20, AA	12	20	3	24	2600	4355		Wh.	54	Own	4 Ver.	4¾ x 5	900
41		E-B 20-35	20	35	5	28	3300	9700		Wh.	72	Own	4 Ver.	5 x 7	700
42	Emmerson, Brantingham Co., Rockford, Ill.	E-B, Reeves	40	60	8-10	44	10000	22750		Wh.	90	Spec.	4 Ver.	7¾ x 9	500
43		Fageol, D	9	12	2		1450	3500	1,525	Lyc.	48	4 Ver.	3½ x 5	1250	
44	Ford & Son, Inc., Henry, Dearborn, Mich.	Fordson	12	20	2	20-34		2750	750		42	Own	4 Ver.	4 x 5	1000
45	Four-Drive Trac. Co., Big Rapids, Mich.	Fitch, 4	20	35	3-4	28-30	3200	6000	2,800	Wh.	F-36x12 R-42x12	Clim.	4 Ver.	5 x 6½	850
46		Frick	12	24	3	22-26		5800		Wh.	60	Erd.	4 Ver.	4 x 6	900-1000
47	Frick Co., Waynesboro, Pa.	Frick	15	30	3-4	26		6000		Wh.	60	Beaver	4 Ver.	4¾ x 6	900-1000
48		G-O	14	28	8	30		4200	1,485	Wh.	46	Wauk.	4 Ver.	4½ x 5¾	1000
49	General Ordinance Co., Cedar Rapids, Ia.	Gray	18	36	4	28	3300	6200		Drum	54	Wauk.	4 Ver.	4¾ x 6¾	850
50	Hart-Parr Co., Charles City, Ia.	Hart-Parr, 30		30	3	28	3000	5570	1,395	Wh.	52	Own	2 Hor.	6½ x 7	750
51	Holt Mfg. Co. Peoria, Ill.	Caterpillar, 5-Ton	25	40	4	32-52	3100	9400		Cr.		Own	4 Ver.	4¾ x 6	1050
52		Caterpillar, 10-Ton	40	60	6	40-60	5000	19000		Cr.		Own	4 Ver.	6½ x 7	700
53	Huber Mfg. Co., Marion, Ohio	Huber, 12-25	12	25	3	24 x 42	2400	5000		Wh.	60	Wauk.	4 Ver.	4¾ x 5¾	1000
54	Illinois Tractor Co., Bloomington, Ill.	Illinois, C	18	30	4	24-28	3500	5200	2,375	Wh.	54	Clim.	4 Ver.	5 x 6½	800
55		International	8	16	2		1350	3600		Wh.	40	Own	4 Ver.	4¼ x 5	1000
56	International Harvester Co., Chicago	Titan	10	20	3		1800	5710		Wh.	54	Own	2 Hor.	4¾ x 8	575
57		International	15	30	4		2500	8990		Wh.	66	Own	4 Hor.	5¼ x 8	575
58	J. T. Tractor Co., Cleveland, Ohio	J. T., N	16	40	3	30	3200	6500	2,800	Cr.		Chief	4 Ver.	4¾ x 6	1000
59	Kardell Trac. & Tr. Co., St. Louis, Mo.	Kardell Utility	10	20	2			3500				Wis.	4 Ver.	4 x 5	

Abbreviations: Traction—Wh., wheel; Cr., crawler. Engine—Beav., Beaver; Veer., Veerac; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers—Ver., vertical; Hor., horizontal; Opp., opposed. Fuel—G., gasoline; K., kerosine; D., distillate. Carbureter—Ray, Rayfield; King., Kingston; Holl., Holley; Cleaner—Donal., Donaldson; Ben., Bennett; Holl., Holley. Magneto—A-K, Atwater-Kent; Sum., Sumter; Eise., Eisemann; Berl., Berling; Clutch—B. & B., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch. Final drive—S. G., spur gear; G., gear; Ch., chain; R. P., roller pin.

# and Their Technical Specifications

These tables are revised and brought up to date monthly

Line No.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt Speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final Drive	Drive	Furrow wheel	Line No.
1	K-D	2 1/4-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	19	5 0	2790	2	2.1-3.26	2.1	B. G.	Op.	No	1
2	K-D	2 1/4-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	23	530	3190	2	2.1-3	2.1	G. B.	Op.	No	2
3	K-D	2 1/4-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	26	450	3060	2	2-3.2	2	B. G.	O.	No	3
4	K-D	3 1/4-Own	None	Bosch	Own	Own	Sl. G.	Own	Own	Own	Own	36	375	3540	1	1.9	1.9	B. G.	Op.	No	4
5	G-K	1 1/4-King	Ben.	Opt.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	15	830	3200	2	2.3-2.8	2.8			Yes	5
6	G-K	1 1/4-Scheb.	Ben.	Bosch	B. & B	Nutt.	Sl. G.	Perfex	Hyatt	Own	Hyatt	7 1/2	825	2600	2	2 1/4-3 1/2		I. G.		Yes	6
7	G-K-D	1 1/4-King.	Ben.	Eise.	Own	Own	Sl. G.	Hoooven	Hyatt	Own	Hyatt	20	450	2400	1	2.2-2.49	2.5	I. G.		Yes	7
8																					8
9	G-K-D	2 -King.		Eise.	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150		1.2-93	2.13	B. G.		No	9
10	G-K-D	2 1/4-King		Eise.	Own	Own	Sl. G.	Own	Own	Own	Own	24	500	3150	2.2	1-2.2	2.2	B. G.		No	10
11	G-K	1 1/4-King	Ben.	Eise.	B. & B	Own	Sl. G.	McCord	U. S.	Timk.	Timk.	10	996	2600	2	2 1/4-4	2 1/4	I. G.	In	Yes	11
12									Gurney												12
13									Hyatt												13
14	G-K	1 1/4-King.		K-W	Own	Own	C. M.	Own		Own	Own	17 1/2	600	2750	2	1 1/4-3	1 1/4	S. G.	Op.		14
15	D-A																				15
16	G-K-D	1 1/4-King		K-W	Own	Own	C. M.	Own		Own	Own	19 1/2	570	2910	2	1 1/4-2 1/4	1 1/4	S. G.	Op.		16
17	G-K-D	1 1/4-King		K-W	Own	Own	C. M.	Own		Own	Own	16	700	2930	2	2 1/4-3 1/2	2	S. G.	Op.		17
18	G-K-D	1 1/4-King		K-W	Own	Own	C. M.	Own		Own	Own	18	650	3065	2	2-3	2	S. G.	Op.		18
19																					19
20	G-K-D	2-King.		K-W	Own	Own	C. M.	Own		Own	Own	22	500	2880	2	2-3	2	S. G.	Op.		20
21																					21
22	G-K-D	2-King.		K-W	Own	Own	C. M.	Own		Own	Own	26	500	3400	2	1 1/4-2 1/4	1 1/4	S. G.	Op.		22
23	G-K-D	4 1/4-Ben.	Ben.	Dixie	B. & B	Own	Sl. G.	Modine	Timk.	Timk.	T. & H.	12	725	2300	2	2.33-3.5	2.33	S. G.			23
24																					24
25	D	1 1/4-Ens.	Ben.	Split.	Own	Own	Sl. G.	Own	Hyatt		Hyatt	9	9000	1971	2	2 1/4-3	3	I. G.			25
26									Timk.												26
27	D	2-Ens.	Ben.	Bosch	Own	Own	Sl. G.	Own	Hyatt		Timk.	16	650	2720	2	3-2	3	I. G.			27
28									Timk.												28
29	G-K-D	Strom.	Own	Bosch	Hill.	Own	Sl. G.	Modine	Opt.		H. & T.		900	2600	2	1.3-2.5		S. G.	In.		29
30	G-K-D	1 1/4-King.	Donald	K-W							Hyatt	12	750		1	2.4-2 1/4	2.4	B. G.			30
31	K	1 1/4-Scheb.	Ben.	K-W	Own	Own		Spec.	S. K. F	Hyatt	Hyatt	13	750	750	2	1 1/4-3	2 1/4	G.			31
32									Hyatt												32
33	G-K-D	1 1/4-Ben	Ben.	Bosch	Twin	Own	Sl. G.	Modine	Timk.	Hyatt	Timk.	18	430		2	1 1/2-3 1/2	2 1/2	S. G.			33
34	K	1 1/4-King.	Own	King.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	14 1/4	1050	3916	2	2 1/4-3 1/2	2 1/4	S. G.	In.	No	34
35	K	1 1/4-King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	16	900	3762	2	2 1/4-3 1/2	2 1/4	S. G.	In.	No	35
36	K	2-King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Timk.	Hyatt	16 1/2	850	3669	2	1.2-3.2	2.2	S. G.	In.	No	36
37									Timk.												37
38	G-K-D	1-King.	Own	Eise.	Own	Own		McCord				8	1265	2500	1	1-3 1/2	3 1/2	I. G.			38
39				Teagle																	39
40	G	1 1/4-King.	R. W.	Split.	Own	Own	Sel. G.	Own	Gurney	Timk.	Timk.	12	710	2600	3	1 1/4-6	2 1/2	B. G.	In.	Yes	40
41	G	1 1/4-King.	R. W.	Split.	Own	Own	Sel. G.	Own	Gurney	Timk.	Timk.	12	710	2600	3	1 1/4-6	2 1/2	B. G.	In.	Yes	41
42	G-K-D	1 1/4-King.	Ben.	Dixie	Own	Own	Sel.	Perfex	Hyatt	Own	Own	10	1000	2600	2	2-3	2	I. G.		Yes	42
43									N. D.												43
44	G-K-D	2 -King.	Ben.	Dixie	Own	Own	Sel.	C. & P.	Own	Own	Own	15	800	2950	3	2-5 1/2	2	I. G.		No	44
45	K	1 1/4-King.	Own	King.	Own	Own	Sel.	Eureka	Own	Own	Own	14	800	2800	2	2 1/4-3 1/2	2 1/4	I. G.	Op.		45
46	K-D	1 1/4-King.	Ben.	K-W	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2 1/2	1.8	Ch.	Op.		46
47	G-K-D	1 1/4-Holl.	Ben.	Dixie	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2 1/2	1.8	Ch.	Op.		47
48	G-K	1 1/4-Linga	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	20	450	2350	2-3	1 1/2	2	G.		Yes	48
49	G-K	2 -Linga	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	24	450	2827	2-3	1 1/2	2	G.		Yes	49
50	K	1 1/4-King.	Ben.	King.	Own	Own	Sl. G.	Perfex	Hyatt			13 1/2	800	2500	3	1 1/2-3 1/4	2 1/2	B. G.			50
51	K	1 1/4-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	12	708	2225	3	1.64-2.25-3.4	3.4	G.	Op.	Yes	51
52	K	1 1/2-Ben.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	12	900	2800	2	1.81-2.33	2.33	G.	In.	No	52
53	K	1 1/2-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	16	597	2500	2	1.71-2.26	2.26	G.	Op.	Yes	53
54	K	2 1/2-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Own	Own	Own	22	500	2880	1	2	2	B. G.	Op.	Yes	54
55	G-K-D	1-Zen.	Own	Dixie	Own	Own	C. M.	Modine	Timk.	Timk.	Timk.	8	1250	2600	1	3/4-3	2 1/2	S. G.			55
56	K	Own	Own	Own	Own	Own	Sl. G.	Own	Gurney	Timk.	Timk.	9 1/2	1000		3	1-8	2 1/4	Worm	In.		56
57																					57
58	K	1 1/2-King.	Ben.	Dixie	B. & B.	Cotta	Ind. Cl	Spirex	Timk.	Timk.	Timk.	14	650	2275	3	3/4-4	2 1/2	F. Bevel		No	58
59																		R. Worm			59
60	K	-King	Ben.	King.	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2 1/2	S. G.		Yes	60
61	K	Ben.	Ben.	Dixie	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2 1/2	S. G.		Yes	61
62	G-K	1 1/4-King.	Ben.	Eise.		Own	C. M.	Perfex	S. K. F.			10	970		6	1 1/4-3	2 1/2	S. G.	In.	No	62
63	K	1 1/4-Strom.	Own	Berl.	Own	Own	Sl. G.	McCord	Hyatt	Timk.	Hyatt	12	930	2900	2	2 1/4-4 1/2	2 1/4	S. G.	In.	Yes	63
64	K	K-Shunt.	Own	K-W	Own	Own	Sl. G.	S-J	S. K. F.	Own		14	750	2750	2	2.4-3.5-2.3	3	I. G.	Op.	Yes	64
65									Hyatt												65
66	G	1 1/2-Scheb.	Donald.	Eise.	Own	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	12	1012	3150	3	1.5-5.7	3	G.	In.	No	66
67	G	2 -King.	Donald	K-W	Own	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	14	850	3120	3	1.65-4.78	3	G.	In.	No	67
68	G-K	1 1/4-King.	Ben.	King.	Own	Own	Sel.	Perfex	G. & H	Own	Own	13	1000		2	2.4-3-3.75	4.3	S. G.	Op.	Yes	68
69	K	1 1/2-Strom.	Ben.	Dixie	Twin	Foot	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14	600	2400	2	2 1/4-3.4	2 1/4	S. G.	In.	Yes	69
70	G-K-D	-Ens.		Dixie	Own		Sl. G.	B. & L.	Own	Own		12 1/4	623			1 1/4-4.1	2 1/2	Ch.	In.		70
71	G-K-D	-Own		K-W	Own		Sl. G.		Own	Own		18	575			2 1/4-2 1/2	2 1/2	Ch.			71
72	G-K-D	-Own		K-W	Own		Sl. G.		Own	Own		18	575			2 1/4-2 1/2	2 1/2	Ch.			72
73	E	1 1/2-Own	Ben.	K-W	Own	Covert	Sel.	McCord	Timk.	Hyatt	Hyatt	10	1 00	2600	3	1 1/4-5	2 1/2	I. G.	In.	No	73
74	G	1 -Carter	Ben.	Dixie				Eureka					800		2						74

turers; Auto., Automatic; Weid., Weidley; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten, Rutenber; Over., Overland; Kenn., Kenneth. Cylind. Scheb., Schebler; Ben., Bennett; Zeph., Zephyr; Ens., Ensign; Strom, Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter; Perr., Perrin-Ingram. Air Borg & Beck; Bier., Bierman; Mun., Muncie; Rock, Rockwell; Spec., special. Gearset—B. & S., Brown & Sharpe; Nutt, Nuttall. Gearset type—Sl. G., roller pinion. Drive—Op., open; In., inclosed.



# Motor Age Monthly Guide to Tractors

These tables are revised and brought up to date monthly

Line No.	Manufacturer	Tractor and Model	Drawbar horse power	Belt horse power	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
75	Keck Gonnerman Co., Mt. Vernon, Ind.	Keck-Gonnerman, B.	12	24	3	24 x 40	2500	6500	1,500	Wh.	60	Own	2 Hor.	7 1/4 x 8	700
76		Flour City, Jr.	14	24	3	24					60	Own	4 Ver.	5 x 5	800
77	Kinnard & Sons Mfg. Co., Minneapolis, Minn.	Flour City	20	35	4-5	28		10000			72	Own	4 Ver.	5 1/4 x 6	800
78		Flour City	30	50	6-8	30		14000			84	Own	4 Ver.	6 1/4 x 7	550-600
79		Flour City	40	70	8-10	36		21000			96	Own	4 Ver.	7 1/2 x 9	450-500
80	La Crosse Trac. Co., La Crosse, Wis.	La Crosse, G.	12	24	3	22	2000	4000	875	Wh.	56	Own	2 Hor.	6 x 7	750
81	Lanson, John, Mfg. Co., New Holstein, Wis.	Full Jewel	15	30	3-4	24-30	3000	6500	2,150	Wh.	54	Beav.	4 Ver.	4 3/4 x 6	950
82	Liberty Tractor Co., Minneapolis, Minn.	Liberty	18	32	4	30	3380	5900	2,475	Wh.	48	Clim.	4 Ver.	5 x 6 1/2	850
83		Twin City, 12-20	12	20	3	20-24	2000	4200	1,595	Wh.	50	Own	4 Ver.	4 1/2 x 6	1000
84		Twin City, 16-30	16	30	4	24-28	3000	7800	2,400	Wh.	54	Own	4 Ver.	5 x 7 1/2	650
85	Minneapolis Steel & Machinery Co., Minneapolis, Minn.	Twin City, 25-45	25	45	6	32-34	6700	16000	3,800	Wh.	76	Own	4 Ver.	6 1/4 x 8	800
86		Twin City, 40-65	40	65	8	40	7500	23700	4,850	Wh.	84	Own	4 Ver.	7 1/4 x 9	535
87		Twin City, 60-90	60	90	12	40	11250	2800	5,850	Wh.	84	Own	6 Ver.	7 1/4 x 9	535
88	Moline Plow Co., Moline, Ill.	Universal D.	9	18	2	22	2100	3380	1,500	Wh.	52	Own	4 Ver.	3 1/2 x 5	1650
89	Nichols & Shepard Co., Battle Creek, Mich.	Oil-Gas, 25-50	25	50	6	25-32x52		19000		Wh.	28	Own	2 Hor.	9 x 12	350-425
90		Oil-Gas, 35-70	35	70	8-10	52-64		30000		Wh.	32	Own	2 Hor.	10 1/2 x 4	300-375
91	Parrett Tractor Co., Chicago Heights, Ill.	Parrett, H.	12	25	3		2800	5225		Wh.	60	Buda	4 Ver.	4 1/4 x 5 1/2	1000
92	Peoria Tractor Corp., Peoria, Ill.	Peoria, J.	12	25	3	26	3000	5100	1,985	Wh.	56	Clim.	4 Ver.	5 x 6 1/2	800
93	Pioneer Tractor Co., Winona, Minn.	Pioneer, 18-36	18	36	4	28	4000	6100			60	Own	4 Ver.	5 1/2 x 6	750
94		Pioneer, 30	30	60	10	36	8000	24000			96	Own	4 Ver.	7 x 8	650
95	Plow Man Tractor Co., Waterloo, Ia.	Plow Man, 15-30	15	30	3-4	30	3000	5100	1,895	Wh.	60	Buda	4 Ver.	4 1/2 x 6	1000
96	Pope Mfg. Co., Watertown, S. D.	Dakota, 4	15	27	3	24	2000	5700	1,750	Wh.	42	Doman	4 Ver.	4 3/4 x 6	800
97	Post Trac. Co., Cleveland	Post, D.	12	20	2			4300		Wh.	32	Wauk.	4 Ver.	4 3/4 x 5 1/2	800
98	Pt. Huron Eng. & T. Co., Pt. Huron, Mich.	Port Huron, 12-25	12	25	3	22-38	2200	5900		Wh.	56	Chief	4 Ver.	4 3/4 x 6	900
99															
100	Reed Fdy. & Mach. Co., Kalamazoo, Mich.	One-Man	12	25	3	22-24		5000	1,685	Wh.	60	Wauk.	4 Ver.	4 1/2 x 5 1/2	1000
101	Rock Island Plow Co., Rock Island, Ill.	Heider, D.	9	18	2	20	1500	4000		Wh.	57	Wauk.	4 Ver.	4 1/4 x 5 1/4	800
102		Heider, C.	12	20	3	24	2000	6000			57	Wauk.	4 Ver.	4 1/2 x 6 1/4	750
103		Russell Junior	12	24	2	18	2000	6200		2 Wh.	53	Wauk.	4 Ver.	4 1/2 x 5 1/4	1000
104	Russell & Co., Massillon, Ohio	Russell Little Boss	15	30	3	24	3000	6900		2 Wh.	53	Wauk.	4 Ver.	4 1/2 x 6 1/4	950
105		Russell Big Boss	20	35	4	30	4000	7600		2 Wh.	60	Model	4 Ver.	5 1/2 x 7	825
106		Russell Giant	30	60	8	40	8	24000		2 Wh.	84	Own	4 Ver.	8 x 10	525
107	Shelby Trac. & Tr. Co., Shelby, O.	Shelby, C.	9	18	2	20	2000	3500		Wh.	42	Wauk.	4 Ver.	3 3/4 x 5 1/4	1000
108	Short Turn Tractor Co., Minneapolis, Minn.	Short Turn, D.	20	40	3	24		5000	1,500	Wh.	65		4 Ver.	4 3/4 x 6	950
109															
110															
111	Square Turn Tractor Co., Norfolk, Nebr.	Square Turn, A	18	35	3	28	3200	7400	1,875		60	Clim.	4 Ver.	5 x 6 1/2	850
112	Stinson Trac. Co., Superior, Wis.	Stinson, 4-E.	18	36	4	28-30		7100		Wh.	60	Beav.	4 Ver.	4 3/4 x 6	950
113	Topp-Stewart Trac. Co., Clintonville, Wis.	Topp-Stewart, B.	20	35	3-5		5000	7500	3,000	Wh.	42	Wauk.	4 Ver.	4 3/4 x 6 3/4	900
114	Turner Mfg. Co., Pt. Washington, Wis.	Simplicity	14	40	3	24	2600	4300	1,675	Wh.	54	Buda	4 Ver.	4 1/4 x 5 1/2	1000
115	U S. Trac. & Machy. Co., Menasha, Wis.	Uncle Sam, B-19	20	30	3	28	3000	4250			50	Beav.	4 Ver.	4 3/4 x 6	900
116	Vim Tractor Co., Schleisingerville, Wis.	Vim	10	20	2	20	1800	3200	1,485	Wh.	48	Wauk.	4 Ver.	3 3/4 x 5 1/4	1000
117	Waterloo Gasoline Eng. Co., Waterloo, Ia.	Waterloo Boy, N	12	25	3		2000	5900		Wh.	52	Own	2 Hor.	6 1/2 x 7	750
118	Wetmore, H. A., Sioux City, Ia.	Wetmore	12	25	2	22		2900	1,485	Wh.	46	Wauk.	4 Ver.	4 x 5 1/4	960
119	Wisconsin Farm Trac. Co., Sauk City, Wis.	Wisconsin, E.	16	30	3-4	28	3500	5440		Wh.	52	Clim.	4 Ver.	5 x 6 1/2	800
120	Yuba Mfg. Co., Marysville, Calif.	Ball Thread	12	20	3		3500	6750	2,945	Cr.		Wauk.	4 Ver.	4 1/2 x 6 3/4	700
121		Ball Thread	20	35	5-6		5000	10100	4,465	Cr.		Wise.	4 Ver.	5 1/4 x 7	700

## One- and Two-Horse Tractors

122	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	General Purpose	6	12	1-16		1000	2500	795	Wh.	48	Le Roi	4 Ver.	3 1/2 x 4 1/2	1000
123	Atlantic Mch. Mfg. Co., Cleveland, Ohio	Merry Garden					250		185						
124	Avery Co., Peoria, Ill.	Avery, 5-10 B.	5	10	2	22 x 32	800	2600		Wh.	38	Own	4 Ver.	3 x 4	1200
125		Avery, 6-cyl.	7	12		22-32		3150		Wh.	38	Own	6 Ver.	3 x 4	1200
126	Beeman Tractor Co., Minneapolis, Minn.	Beeman, G.	2	4	1-7	None	260	550	310	Wh.	25	Own	1 Ver.	3 1/2 x 4 1/2	850
127	Elderfield Mechanics Co., Pt. Washington, N. Y.	Universal, 20	1	4	1		250	750	450		36	Own	1 Ver.	3 1/2 x 5	1000
128	Indiana Silo Co., Anderson, Ind.	Indiana	5	10	1		900	2000		Wh.	50	Le Roi	4 Ver.	3 1/2 x 4 1/2	950
129	La Crosse Trac. Co., La Crosse, Wis.	La Crosse, M.	7	12	1-16	18	1000	2600	750	Wh.	48	Own	2 Hor.	4 x 6	1000
130	Market Garden Trac. Co., Minneapolis, Minn.	Market	2	4 1/2	1-7		550				24	Vurac	1 Hor.	4 x 4	850
131	Midwest Engine Co., Indianapolis, Ind.	Utilitor	2	4	1		150-200	750	345	Wh.	24 1/4	Own	1 Ver.	3 1/2 x 4 1/2	1200
132	Scientific Farming Mch., Minneapolis, Minn.	Princess Pat	12	25	2	24-26	2000	3500	1,750	Wh.	46	Buda	4 Ver.	4 1/4 x 5 1/2	1000
133	Toro Motor Co., Minneapolis, Minn.	Toro		12	2		1100	2400	900	Wh.	42	Le Roi	4 Ver.	3 1/2 x 4 1/2	1200

## Motor Cultivators

134	Avery Co., Peoria, Ill.	Avery, C.						3450		Wh.	38	Own	4 Ver.	3 x 4	1200
135	Bailor Plow Mfg. Co., Atchison, Kans.	Bailor, A.	6					2150	925	Wh.	44	Le Roi	4 Ver.	3 1/2 x 4 1/2	1000
136		Bailor, W.	6					1800	775	Wh.	40	Le Roi	4 Ver.	3 1/2 x 4 1/2	1000
137	Detroit Culto-Tractor Corp., Detroit, Mich.	Detroit Culto, AA	9	16	2	20x28	1600	1800	775	Wh.	42	Own	2 Ver.	4 x 6	400
138	Emmerson-Brantingham Co., Rockford, Ill.	E-B			None			3200		Wh.	42	Le Roi	4 Ver.	3 1/2 x 4 1/2	100
139	Toro Motor Co., Minneapolis, Minn.	Toro					1100	2700		Wh.	42	Le Roi	4 Ver.	3 1/2 x 4 1/2	1200
140	Wilson Trac. Co., Peoria, Ill.	Wilson, J.	6	12	2			3000	890		44	Le Roi	4 Ver.	3 1/2 x 4 1/2	1000

Abbreviations: Traction—Wh., wheel; Cr., crawler. Engine—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Kenn., Kenneth. Cylinders—Ver., Vertical; Hor., horizontal; Opp., opposed. Fuel—G., gasoline; K., kerosene; D., distillate. Carbureter—Ray, Rayfield; King, Cr., Carter; Perr., Perrin-Ingram. Air-Cleaner—Donal., Donaldson; Ben., Bennett; Hol., Holley. Magneto—A-K, Atwater Kent; Sum., Sumter; Eise., Nutt., Nuttall. Gear type—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch. Final drive—S. G., spur

# and Their Technical Specifications

Tractor specifications appear the last issue of each month

Line No.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt Speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing spec	Final Drive	Drive	Furrow wheel
75	K	-Scheb.	Ben.	Bosch	Own	Own	Sl. G.	Own				11 1/2	700		3	2 1/2-3 1/2	3	S. G.		75
76	G-K	1 1/2-Scheb.		K-W	Own	Own		Long	Hyatt			26	320		2	2 1/4-3 1/4	2 1/4	G.		76
77	G-K	1 1/2-Scheb.		K-W	Own		Sel.	Modine				26	350		2	2 1/4-3	2 1/4	G.		77
78	G-K	2 -Scheb.		K-W	Own			Modine				32	275		1		2 1/2	G.		78
79	G-K	2 1/2-Scheb.		K-W	Own			Modine				34	275		1		2 1/2	G.		79
80	K	1 1/2-King.	Ben.	Own	Own	Own		Modine	Hyatt	Hyatt	Hyatt	7x11	750	2125	1	2-2 3/4	2 1/2		Yes	80
81	G-K-D	1 1/2-King.		Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Timk	Hyatt	18	475	2200		1 3/4-2 1/2	2 1/2	G.	In.	81
82	G-K	1 1/2-Strom.	Ben.	Dixie	Bier.	Own		S-J	Hyatt	Own	Own	12	900	2825	2	2 1/2-5	2 1/2	S. G.	In.	82
83	G-K	1 1/4-Holl.	Ben.	Bosch	B. & B.	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	650	2700	2	2-2.9	2.9	S. G.	In.	83
84	G-K	1 1/2-Holl.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	17	528	2350	2	2-2.75	2 3/4	S. G.	In.	84
85	G-K	2 -King.		K-W	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	2	1.4-2	2	S. G.	Op.	85
86	G-K	2 1/2-King.		K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	200	1	2	2	G.	Op.	86
87	G-K	3 -King.		K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	S.	Op.	87
88	G	1 1/2-Holl.	Ben.	Remy	B & B.	Own	Sl. G.	Modine	Hyatt		Hyatt	9		2600	1	1 1/2-3 1/2	3 1/2	G.	In.	88
89	K	2 1/2-King.		Wico.	Own	Own	Sl. G.	Perfex	Own	Own	Own	9x24			1	2-2.42	2-2.42	S. G.		89
90	K	3 -King.		Wico.	Own	Own	Sl. G.	Perfex	Own	Own	Own	12x30			1	1.56	1.86	S. G.		90
91	K	1 1/4-King.	Own	Eise	Own	Own	Sl. G.	Perfex		Hyatt	Hyatt	12	1000	3141	3	1.80-4		I. G.	In.	91
92	K	1 1/2-Strom.	Ben.	Eise.	Own	Nutt	Sl. G.	Eureka	Hyatt			14	650	2500	2	2 1/2-4	2 1/2	I. G.	Yes	92
93	G-K	1 1/2-King.	Ben.	K-W	Own	Own		S-J	Timk.	Timk.	Timk.	14	750		3	1 3/4-4	2 1/2	S. G.		93
94	G-K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	S-J	Own	Own	Own	17 1/2	650		3	1 3/4-4 1/4	2 1/2			94
95	G-K	1 1/4-Strom.	Len.	Dixie	Twin	Foot	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	14	500	2200	2	2-3		I. G.	Op.	95
96	K	1 1/4-Linga	John.	K-W	Bier.	Own	Sl. G.	S-J	Own	Own	Own	14	800	2500	1	3	3	Ch.	Yes	96
97	G-K	-King.	Ben.	Split.	Own	Own		Perfex	Opt.	Timk.	Timk.	14	2500		2	3-3	3	G.	Yes	97
98	G-K	1 3/8-King.		King.	Own	Own		Bremer	S. K. F.	Plain	Plain	14	650-1065	2380-3900	7	1 1/2-4	2	S. G.	In.	98
99		-King.																		99
100	G-K	1 1/4-Ben.	Ben.	Dixie	Bier.	Own	Sl. G.	Modine	Hyatt		Hyatt	14 1/2	2600	703	2 1/2-3 1/2		2 1/2	B. G.	In.	100
101	G-K	1 -King.	Ben.	Dixie	Own		Fr.	Perfex	U. S.		Own	12	700	2200	7	1-5	1 1/4	B. G.	Op.	101
102	G-K	1 1/2-King.	Ben.	Dixie	Own		Fr.	Perfex	U. S.		Own	14	600	2200	7	1-4	2 1/4	B. G.	Yes	102
103	K	1 1/4-King.	Ben.	Bosch	Own	Cotta	Sl. G.					12 1/2	915	3000	3	1 1/2-3 3/4	2 1/4	S. G.	Op.	103
104	K	1 1/4-King.	Ben.	Dixie	Own	Cotta	Sl. G.					12 1/2	810	2550	3	1 1/2-3 3/4	2 1/4	S. G.	Op.	104
105	K	1 1/2-King.	Ben.	Dixie	Own	Own	Sl. G.					12 1/2	840	2749	2	2.4-3 3/4	2.4	S. G.	Op.	105
106	K	2 -King.	Ben.	Bosch	Own	Own	Sl. G.					24	525	3310	2	2-4 1/2	2	S. G.	Op.	106
107	G	1 -King.	Ben.	Dixie	Full.	Full.	Sl. G.	Modine		Timk.	Timk.	10	850	2200	3	1 3/4-4 3/4	2 1/2	I. G.	In.	107
108	G-K	1 1/2-Opt.	Opt.	Dixie		Own	Sel	Splitex	Own	Own	Own	18	950		2	2-3	2 1/2-3	I. G.	Yes	108
109												700								109
110												490								110
111	G-K	1 1/2-Strom.	Ben.	Dixie		Own		Modine	Hyatt	Hyatt	Hyatt	12	850	2669	1	2 1/2	2 1/2	I. G.		111
112	K	1 3/8-King.		Dixie	Own	Own	Sl. G.	Todd	Hyatt	Hyatt	Own	12	950	2985	1	2 1/2-3	3	S. G.	In.	112
113	G	1 1/2-Strom.	Ben.	Eise.	B. & B.	Own	Sel.	Bremer	Hyatt	N. D.	N. D.	12	900	2600	3	1 3/4-4 1/2	2 1/2	I. G.		113
114	G-K	1 1/4-King.	Ben.	Dixie	Own	Own		Perfex	Hyatt	Own	Own	14	600	600	2-2 1/2	1 3/4-3	2 1/2		Yes	114
115	K	1 1/2-Ben.	Ben.	Dixie	Twin	Nutt.	Sl. G.	Perfex	Timk.	Timk.	Timk.	11	900	2600	2.6-3.8	2-4	2.6	S. G.	In.	115
116	G-K	-Ben.	Ben.	Simms	B. & B.		Sl. G.		Gurney	Hyatt	Hyatt	9	10	2300	2	2 1/2-5	2 1/2	I. G.	Yes	116
117	K	1 1/2-Scheb.		Dixie	Own	Own	Sl. G.	Modine	Hyatt		Hyatt	14	750	2750	2 1/4-3	2 1/4-3	2 1/4-3	S. G.	In.	117
118	G	1 1/4-Ki-g.		Dixie	Full.	Fuller	Sl. G.	Ideal			Timk.	12	900		3	2-5	3	I. G.	In.	118
119	K	1 1/2-Strom.	Ben.	Eise.	B. & B.	Foot	Sl. G.	Perfex	Hyatt			16	600	2600	2	1 1/2-4	2 1/2	S. G.	In.	119
120	D	1 1/4-Ens.	Donald	Bosch	B. & B.	Own	Sl. G.	Own	Hyatt		Hyatt	12	700	2200	3	1.5-4	2.08	B. P.		120
121	D	-Strom	Donald	Bosch	Para.	Own	Sl. G.	Own	Hyatt		Hyatt	10-14	700	1835	2	2.06-3.28	2.06	I. G.		121

## One- and Two-Horse Tractors

122	G	7/8-King.	Ben.		B. & B.	Own	Sl. G.	Own	Gurney	Own	Own	10	1000	260	1	1 1/2-2.4	2.4			Yes	122
123	G-K	3/4-King.		K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	12	780	2450	3	1 1/2-4 1/4	2 1/2	S. G.	Op.		123
124	G-K	3/4-King		K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	12	780	2450	3	1 1/2-4 1/4	2 1/2	S. G.	Op.		124
125	G	3/4-King.	Donald	Heinze	Own	Own		S-J		None	None	4 1/2	850	900	1	3/4-3	2	G.		Yes	125
126	G	7/8-Zen.		A-K	Own	Own		Main				6	1000		1	1-3	2	Worm			126
127	K	7/8-King.	Ben.	A-K	Own	Own	Sl. G.	Cand.					1200		1 1/4-4		Ch.	Op.		127	
128	K	1 1/4-King.	Ben.		Own	Own	Own	Hopper		Own	Own	10	1000	2600	1	1 1/2-2 1/2	2 1/2		Yes		128
129	G	1 1/2-Vierac	Ben.	Berl.	Own	Own	Spec.		Timk.			6	2000		1	1 1/2-2 1/2	2 1/2	Worm			129
130	G	3/4-King.	Own	Eise.	Own	Own		Modine	Fafnir.			4 1/2	1200	1200	1	2 1/2	2 1/4	I. G.	In.		130
131	K	1/4-Ben	Ben.	Dixie	B. & B	Own	Sl. G.	S-J	Hyatt	Hyatt	Hyatt	12	1000	3100	2	2 1/2-4 1/2	2	I. G.	In.	Yes	131
132	G	7/8-King	Ben.	Eise.	Own	Own	Sl. G.	B. & W.	Opt.		Hyatt	8	1200	2400	2	1-3 1/2	3 1/2	S. G.	In.		132
133																					133

## Motor Cultivators

134	G-K	3/4-King		K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	12	780	2450	3	1 1/2-4 1/4	2 1/2	S. G.	Op.	134
135	G	7/8-King.	Ben.	Dixie	B. & B.			Perfex	Hyatt	Hyatt	Hyatt				2	2 1/2-3 1/2		Ch.		135
136	G	7/8-King.	Ben.	Dixie	B. & B.			Perfex	Hyatt	Hyatt	Hyatt				2	2 1/2-3 1/2		Ch.		136
137	G	1 1/4-Strom.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Own	8	885	1800	2	1-3	2 1/2	B. G.	In.	137
138	G	-Holl.	Ben.	Dixie	Own	None		Perfex	Hyatt	Own	Hyatt	7 1/2	975		1-5	1 1/2-3 1/2	None			138
139	G	7/8-King	Ben.	E. & D.	Own	Own	Sl. G.	B. & W.		Hyatt	Hyatt	8x6	1200	2400	2	1-3 1/2		B. G.	In.	139
140	G	3/4-King	Own	Eise.	B. & B.	Own	Sel.	Modine	S. K. F.	Hyatt	Hyatt	6	1000	1570	2	1.3-3.5		S. G.	In.	140

Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kingston, Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Eisemann; Berl., Berling; Clutch-B. & B., Borg & Beck; Bierman; Mun., Muncie; Rock., Rockwood; spec., special; Gearset-B. & S., Brown & Sharpe; gear; Ch., chain; D. R., double reduction; B. G., bull gear. Drive-Op., open; In., inclosed.



# From the Four Winds

## Glimpses at the World of Motordom

### Coming Motor Events

#### AUTOMOBILE SHOWS

Spokane, Wash.	Spokane Dealers' Automotive Show	Jan. 21 to 25
Chicago	National Automobile Chamber of Commerce	Jan. 24 to 31
Chicago	Automobile Salon	Jan. 24 to 31
Amsterdam, N. Y.	New York State Armory	Jan. 26 to 31
Kansas City	Overland Bldg.	Jan. 31 to Feb. 6
New Brunswick, N. J.	Annual Show	Jan. 31 to Feb. 7
Minneapolis, St. Paul	Minn. Automobile Trade Ass'n	Jan. 31 to Feb. 7
Bridgeport, Conn.	Eighth Annual Show	Feb. 2 to 7
Toledo, O.	Terminal Auditorium	Feb. 2 to 7
Rochester, N. Y.	Rochester Auto Trades Ass'n	Feb. 2 to 7
Baltimore, Md.	Automobile Show	Feb. 3 to 7
Wilmington, Del.	Hotel DuPont	Feb. 3 to 8
Peoria, Ill.	Automobile Dealers' & Acc. Ass'n	Feb. 4 to 7
Charlotte, N. C.	Charlotte Automobile Trade Ass'n	Feb. 9 to 14
Greenfield, Mass.	Mass. State Armory	Feb. 9 to 14
New Haven, Conn.	Automobile Dealers' Ass'n	Feb. 9 to 14
Nashville, Tenn.	Automobile Show	Feb. 9 to 14
Salt Lake City	Automobile Show	Feb. 9 to 14
Cedar Rapids, Iowa	Automobile Show	Feb. 9 to 14
Deadwood, S. D.	Deadwood Business Club	February
Quincy, Ill.	Automobile Show	Feb. 10 to 15
Evansville, Ind.	Evansville Dealers' Ass'n	Feb. 11 to 14
Albany, N. Y.	Automobile Show	Feb. 14 to 21
Brooklyn, N. Y.	Motor Vehicle Dealers' Ass'n	Feb. 14 to 21
Detroit, Mich.	Detroit Automobile Dealers' Ass'n	Feb. 14 to 21
San Antonio, Tex.	Automobile Show	Feb. 14 to 22
Des Moines, Ia.	Herring Motor Co.	Feb. 16 to 21
Manchester, N. H.	Automobile Show, Academy	Feb. 16 to 20
St. Louis	St. Louis Automobile Mfrs. & Dealers' Ass'n	Feb. 16 to 21
New Haven, Conn.	Automobile Show	Feb. 16 to 21
Indianapolis, Ind.	Automobile Show	Feb. 22 to 28
Duluth, Minn.	Automobile Show	Feb. 23 to 28
San Francisco	San Francisco Motor Car Dealers' Ass'n	Feb. 21 to 28
Ottawa, Canada	Motor Show	Feb. 21 to 28
Bethlehem, Pa.	Sixth Annual Show	Feb. 23 to 28
Louisville, Ky.	Louisville Automobile Dealers' Ass'n	Feb. 23 to 28
Pittsfield, Mass.	Mass. State Armory	Feb. 23 to 28
St. Joseph, Mo.	St. Joseph Automobile Dealers' Ass'n	March 1 to 6
Portland, Ore.	Portland Automobile Trade Ass'n	Feb. 23 to 28
Grand Rapids, Mich.	Automobile Show	Feb. 23 to 28
Wichita, Kan.	Automobile Show	Feb. 23 to 30
Columbus, Ohio	Memorial Hall	Feb. 24 to 28
Newark, N. J.	First Regiment Armory	Feb. 28 to March 6
Omaha, Nebr.	Automobile Show	March 1 to 6
Seranton, Pa.	Automobile Show	March 1 to 6
Buffalo, N. Y.	Buffalo Automobile Dealers' Ass'n	March 1 to 6
Portland, Maine	Portland Automobile Dealers' Ass'n	March 1 to 6
Perth Amboy, N. J.	First Automobile Show	March 1 to 6
Lyons	Automobile Show	March 1 to 8
Springfield, Mass.	Springfield Automotive Dealers' Ass'n	March 1 to 7
Syracuse, N. Y.	Syracuse Automobile Dealers' Ass'n	March 1 to 6
Seattle, Wash.	Seattle Automobile Show	March 1 to 6
Denver	Denver Automobile Trade Ass'n	March 2 to 6
Clinton, Iowa	Clinton Automobile Dealers' Ass'n	March 3 to 6
Lancaster, Pa.	Automobile Show	March 3 to 6
Indianapolis, Ind.	Automobile Show	March 8 to 13
Jersey City, N. J.	Automobile Show	March
Boston, Mass.	Mechanics' Bldg.	March 13 to 29
New Orleans	Automobile Show	March
Little Rock, Ark.	Annual Show, Liberty Hall	March 15
Oklahoma City, Okla.	Oklahoma City Dealers' Ass'n	March 15
Great Falls, Mont.	Automobile Show	March 15 to 22
Wilkes-Barre, Pa.	Passenger Car & Truck Show	March 15 to 22

#### TRUCK SHOWS

Philadelphia	Commercial Museum	Jan. 19 to 24
Chicago	National Automobile Chamber of Commerce	Jan. 24 to 31
Peoria, Ill.	Automobile Dealers' & Acc. Ass'n	Feb. 9 to 10
New Haven, Conn.	Automobile Dealers' Ass'n	Feb. 16 to 21

#### TRACTOR SHOWS

Wichita, Kan.	Wichita Thresher-Tractor Club	Feb. 9 to 14
Kansas City, Mo.	Kansas City Tractor Club	Feb. 16 to 21

#### MISCELLANEOUS CONVENTIONS AND MEETINGS

Chicago	Highway Transport Conference	Jan. 24
Chicago	N. A. D. A.	Jan. 26 to 27
Atlanta, Georgia	Automobile Dealers' Ass'n Convention	Jan. 27
Chicago	National Ass'n of Automobile Show Managers	Jan. 27
Chicago	Society of Automotive Engineers	Jan. 28
Louisville, Ky.	Seventeenth Annual Convention American Road Builders' Ass'n; Tenth American Good Roads Congress and Eleventh National Good Roads Show	Feb. 9 to 13
Lake Charles, La.	Louisiana-Mississippi Automotive Trade Ass'n Convention	March 17 to 18

**Contemplate Changes in Kentucky Motor Laws**—The Louisville Automobile Club, approved a bill providing changes in Kentucky automobile statutes, and will present it to the State Tax Commission and Attorney General Dalton Wednesday, pending submission to the Legislature.

Salient features are: Increased protection from auto thieves, obtaining of licenses through County Clerks and registration of chauffeurs. Provision is made for tonnage to be permitted trucks and commercial vehicles, and a new numbering system, the plate to contain the county number in addition to the individual number.

In case of sale, the number will be transferred with the automobile, but the purchaser must file the transfer with the County Clerk. List of registrants will be forwarded to the department in Frankfort each Monday. The Tax Commission will issue lists of names at a price not to exceed five cents a hundred names.

**Ohio Has Graduated License Fee**—The newly enacted graduated license fee law for Ohio motor cars became a law the last day of the year because of failure on the part of Governor Cox to sign the measure. The governor was not satisfied with the provisions for the care of funds derived from the law, although he was loath to veto it and permitted it to become effective without his signature. He urges upon the legislature an amendment by which the state treasurer instead of the secretary of state is made custodian of the funds which is expected to bring in over \$6,000,000 yearly to be used for road improvement and street repair.

**Wisconsin Shows Car Increase**—Wisconsin registered a total of 226,093 passenger cars during 1919, a net gain of 36,119 over the total registry for 1918, or 189,982. This is the largest increase in any year save one. In 1917 the gain over the previous year amounted to 48,886. But for the fact that the output of cars all year was far below the demand, and probably not more than 65 or 70 per cent of requirements filled, it is considered certain that the 1917 record would have been excelled.

**Buffalo Re-Elects Officers**—All former officers of the Buffalo Automobile Club, the largest city federation of motorists in the world, were re-elected at the annual meeting of the directors. The officers are: Howard M. Heston, president; Charles Clifton, vice-president; Charles L. Couch, treasurer; Dai H. Lewis, secretary. More than 2000 members joined the club in 1919 and the present membership is more than 6000.

**Only Citizens Can Be Members**—The Columbus Automobile Club, Columbus, O., has adopted a resolution denying membership to any motorist who is not a citizen of the United States.

**No Cleveland Factory for Cameron**—The Cameron Motors Corp., New York, calls attention to the fact that they are not building a factory in Cleveland as stated in a recent issue of Motor Age.